TS
1630
.G8

LIBRARY OF CONGRESS.

Chap. ..... Copyright No. .....

Shelf ...Cx 8...

UNITED STATES OF AMERICA.

Textile Record Hand-Book No. 2.

PRACTICE

IN

FINISHING

WOOLENS AND WORSTEDS

BY

F. H. GREENE

PUBLISHED BY THE TEXTILE RECORD

425 WALNUT STREET, PHILADELPHIA, PA.

Dyeing, Drying and Finishing Machinery for Woolens and Worsteds.

H. W. BUTTERWORTH & SONS,

PHILADELPHIA, PA.

MANUFACTURE AS SPECIALTIES:

SINGEING MACHINES, (Gas) Blanche's Patent.
SINGEING MACHINES, (Plate).
WASHING MACHINES, Dolly and Open.
CRABBING MACHINES, Single, Double and Treble.
JIGGERS.
PADDING MACHINES.
DYE KETTLES, with or without Small Engines attached.
BLUEING MACHINES.
DRYING MACHINES, with Horizontal and Vertical Frames, and with Copper and Tinned Iron Cylinders.
SOAPING OR WETTING MACHINES.
FINISHING MACHINES, with any number of Squeeze Rolls.
TENTERING MACHINES, Clamp and Pin Chain.
STEAMING MACHINES.
STEAMING ROLLS.
EXPANSION ROLLS.
DYE-HOUSE TRUCKS AND WAGONS.
MEASURING AND LAPPING MACHINES.

Practice in Finishing

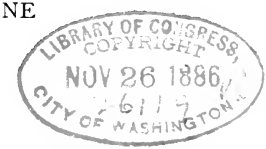
The Art of Finishing

Woolens and Worsteds

in all its details

A Complete Hand-book for the Finishing Room

By FRED. H. GREENE
Master Finisher



Published by THE TEXTILE RECORD
425 Walnut Street, Philadelphia, Pa.
1886

THE contents of this hand-book were originally written for and published in the columns of THE TEXTILE RECORD of Philadelphia. This magazine contains, in each issue, more original matter of practical value to the worker in textiles than any other similar publication in the world. It has late and fresh information for the operator in every department of the woolen and cotton mill, the dye and bleach house, and the knitting mill. The price is only $3.00 a year.

This volume is the second of a series of practical hand-books issued by the publisher of THE TEXTILE RECORD.

8-3136

COPYRIGHTED 1886.
BY CHARLES HEBER CLARK.

FRED H. GREENE.

Fred. H. Greene, the author of this treatise, was born in Pascoag, R. I., April 9, 1858. While he was but a child, his parents moved to Putnam, Conn., then to Alderbrook, Madison County, N. Y., where his father, J. C. Greene, was superintendent for some ten years. Afterwards he was one of the firm of G. B. Mowrey, Son & Co. Here, at the age of fifteen, he was first employed in the office as assistant bookkeeper, and also to assist

about the mill. After attending school later on for two years at Hamilton, N. Y., he was employed in the finishing-room to run a shear, which he continued to do for about a year.

After a brief experience at farming, the family moved to Killingly, Conn., where he was with his father three years in the finishing-room, then one year in the weaving and designing rooms, under Mr. Benjamin Cogswell, of the Sabin L. Sayles Company. He was then about two years wet finisher for the Putnam Woolen Company, Putnam, Conn. He was next in the employ of the Worcester Woolen Company, Worcester, Mass., remaining there nearly three years, until the failure of the company; while there he was unfortunate enough to mutilate the right hand in a gear on a double cylinder rotary gig, but, with good nursing, managed to save most of the hand. Jan. 1, 1885, he accepted a position with the Berkshire Woolen Company at Great Barrington, Mass., where at the present time he has charge of the finishing.

Mr. Greene has made the art of finishing woolen and worsted goods a study. He has not only considered the methods of producing certain effects, but the reasons for those methods—the principles which lie at the bottom of the various processes. This includes, of course, intimate familiarity with the nature and construction of the wool fibre and close acquaintance with the practical details of those branches of chemistry used in the finishing room He has not been satisfied simply to know *how*, but has always sought also to ascertain *why*, and the results of his researches and his experiments are embodied in this hand book, now offered to the public.

Editor of The Textile Record.

TABLE OF CONTENTS.

Page.

Portrait of author, and sketch of his life 3

CHAPTER I.

BURLING.

The right kind of burlers.—The burling tables.—Removing knots.—Treatment of fancy cassimeres.—Methods of payment.—Proper methods of inspecting.—Qualifications of a good sewer . . 7

CHAPTER II.

FULLING.

Difficulty in giving exact directions.—Objects aimed at.—Examples.—Sewing the pieces.—Putting in the mill.—Soaps and oils.—Suggestions as to time.—Fulling fancy cassimeres.—Experiments with soaps.—Rolling or roping the goods . . 14

CHAPTER III.

COCKLES—FLOCKING.

Causes of cockles.—How to prevent them.—Strength of alkalies.—Fair alkalies must be used.—Various methods of flocking.—Dry flocking.—Rule for flocking.—Heavy flocking.—Soap and alkali.—Points about alkali.—Scouring before fulling 25

CHAPTER IV.

GIGGING.

Purposes of gigging.—New and old gigs.—All-wool cassimeres.—Various styles of finish and methods of producing them.—Fancy colors.—Goods with a twist.—Tender goods 38

CHAPTER V.

DRYING. Page

Drying machines or tenter-bars.—The best methods of drying worsteds and woolens.—Practical hints.—Troubles with flocks 50

CHAPTER VI.

SHEARING.

Back-burling —The shears.—Don't tinker at the shears.—Difficulties.—Arranging the shears.—Grinding, etc.—Oiling the swab frequently.—Refusing to cut.—Shearing the goods.—Uneven shearing 55

CHAPTER VII.

CHINCHILLA FINISHING.

Peculiarities of the chinchilla finish.—Methods of operation.—The chinchilla machine.—Setting the machine.—Rubbers and followers. 69

CHAPTER VIII.

INSPECTING AND PRESSING.

Inspecting the fabric.—Specking or fine burling.—Sewing or fine drawing.—Pressing the goods.—Differences in pressing. — Inspection. — The perch. — Shading with sample. — Finishing-room book and how to keep it 75

CHAPTER IX.

WHY GOODS DO NOT FINISH ALIKE.

Variations in the filling.—Oils used upon the stock.—Twist in the yarns.—Wrong shades in the dye-house.—Differences in fulling. — Variations in the gigging and shearing 85

CHAPTER X.

SOME PRACTICAL RECIPES AND FORMULAS.

To find the contents of a tank.—To figure speed.—To remove bur-dye crock.—To test woolen goods 95

THE ART OF FINISHING WOOLENS AND WORSTEDS.

CHAPTER I.

BURLING.

THE RIGHT KIND OF BURLERS.—THE BURLING TABLES.—REMOVING KNOTS.—TREATMENT OF FANCY CASSIMERES.—METHODS OF PAYMENT.—PROPER METHODS OF INSPECTING.—QUALIFICATIONS OF A GOOD SEWER.

Burlers.—As a usual thing, the poorest class of employees are placed at burling, inasmuch as it is generally supposed that any one can burl a piece of goods. Many also have an idea that whatever is left undone in the burling and sewing can easily be remedied after the fabric is finished. This is surely a mistake. Too much care cannot be taken at this point of the work in fixing every place that needs attention before the goods go to the fulling mills.

The burling tables.—In beginning the work, have the tables or burling boards covered with zinc, so that a perfectly smooth surface can be obtained to draw the cloth over, and that every

small bunch or knot may easily be discovered by the burler. On broad or $\frac{6}{4}$ pieces, it is better to have two burlers at a table, although more work can be obtained, in proportion, with one, providing the person is capable of handling it alone. Every knot, slug, bunch, or runner (filling drawn in on the side) should be removed, care being taken not to injure the regular threads, as this only makes extra work for the sewers, who will usually find plenty of business to sew in properly from the looms (unavoidable imperfections).

Removing knots.—There are several methods of removing the knots from the goods, and much depends upon the class, weave, length of time they full, or if they are put up, or shrunk lengthwise or not, in order to prevent imperfections that will show after they are finished. At the same time, it all comes under a general rule, and only care and attention can best determine which way is best to produce satisfactory results. The matter, however, surely should not be left to the judgment of the operative.

A corkscrew weave.—On a corkscrew weave, be it either woolen or worsted, or worsteds of any weave, commence by first burling the back, raising all of the knots and being careful not to draw the thread out so far as to make it tighter than the others. Remove all that is possible on

the face or midway between back and face, in this manner, clipping them off with a pair of scissors half way in the knot, so that it will stand a slight strain before giving way. This will prevent (to some extent) the ends pulling apart when the goods pass through the machines and receive more or less stretching, which they all do. After all have been removed that can be taken out in this way, those that remain must be similarly dealt with when the goods are looked over on the face—using the same precaution as before.

Fancy Cassimeres.—On fancy cassimeres that full a considerable length of time, the knot may be removed on either side by pulling up the ends and breaking off with the burling-irons. But just as much care and attention should be given in this case as in others, especially on hair lines, which are sure to show every little imperfection of the threads. The knots on these should be pulled up and left on for the shears to cut off. If not, they are liable to pull apart, and every one will have to be sewed by the fine drawers after they are finished.

Practical suggestions.—If a piece of goods is put up or shrunk lengthways, say from two to three inches to the yard, it will help greatly to make them perfect. But on any class of goods the burlers should not be allowed to pull off the knots with a dull pair of burling-irons; and on

most classes of fabrics, it is better to use the scissors in connection with the irons.

In small mills, it is practicable to teach the burlers to remove the filling drawn in on the sides, and also the bunches or soft filling, or pieces of waste, that may have been left in. But, in large mills, where from ten to thirty have to be employed, it is almost impossible to do this and have it done properly. It is no small affair to pull out filling that is drawn in for five or six inches, and none but those that have had experience can do it without making the place imperfect. The soft bunches should be picked out, a small piece at a time, so as not to injure the regular threads.

Methods of payment.—In regard to a system of payment for this work, the results in quantity and, possibly, quality, are much better when a stated price per piece is paid. At the same time, something depends upon the class of goods, and the length they are made. A fair and practical system should be followed, so that the employees may have an interest in their work.

I have always used the following successfully, although very likely there are other methods that may be employed with fully as much success. On fancy cassimeres, when the pieces were brought in from the weave-room, I had them nicely piled up, so that when the burlers took

one to burl they took it from the top of the pile, taking their chances of a hard or easy burling piece. I paid forty cents for each piece, or twenty cents to each burler for good work. If they did not do it well the first time, it was returned to them to reburl. If then not properly done, I paid them nothing for the piece. Although this rarely happened, there would be an average of four pieces per day on the usual work which I had. I have had very poor and hard burling pieces, for which I have paid as high as eighty cents per piece. They would not average over two pieces per day. Each burler had a number, which was placed in chalk upon the piece; also each burler had a page upon a book, in which was placed the number and style of each piece burled. These were taken each night and put on the time book to the credit of the burlers.

Inspecting.—The next operation in a large mill is to have a perch conveniently high, and one or two (preferably two) inspectors to look the goods over. They should look at them carefully both back and face, and remove all that the burlers have left. These should be taught to pull out the runners and difficult places in the goods. At the same time, if too much of this appears, it is best to send the pieces back to the weave-room, and let those that have charge of the work there

try their skill. This may put a stop to some of the imperfections.

As the goods are being inspected, all threads out, misspicks and bad places should be marked with chalk for the sewers, that they may readily see them and spend their time sewing, instead of hunting after imperfections. After this is carefully done make a memorandum of each piece, and pass to the sewers.

Sewing.—In order to get the best results possible in mending or sewing a piece of goods, the sewer should thoroughly understand weaving, so that on difficult patterns, if they have the weaving and drawing-in draft, they can readily comprehend how each thread should be sewed. Not that it is strictly necessary for a sewer to be a weaver, for I have seen and known of many that did not know how to change a shuttle on a loom.

On fancy cassimeres, it is essential that the sewer should understand the colors and have a good eye for imitation, that she may take the adjoining pattern for reference as to the weave, the colors, etc., thereby making a nearly perfect work on a difficult damaged place. This can only be accomplished by experience and close attention to this part of the work. On double weaves, or goods that have a backing thread, an out on the back, either filling or warp, will

usually show when finished, and it will be nearly impossible to make these right in any other place. Hair lines should be sewed carefully, leaving the ends out, say, a quarter or half an inch, so that they will not draw apart, and have a space at each end of the thread sewed in blank or imperfect.

On worsted goods this is the most important part of the whole work, and everything that can possibly be fixed or mended, should be done here. After they are sewed, scour them, and, if piece-dyed, again look them over, to be sure they are properly done. Again make a memorandum of the pieces. Then, after numbering by sewing with cotton or woolen yarn, the number, style, yards, and weight, they are ready to be tacked for the fulling mills.

CHAPTER II.

FULLING.

DIFFICULTY IN GIVING EXACT DIRECTIONS—OBJECTS AIMED AT—EXAMPLES—SEWING THE PIECES—PUTTING IN THE MILL—SOAPS AND OILS—SUGGESTIONS AS TO TIME—FULLING FANCY CASSIMERES—EXPERIMENTS WITH SOAPS—ROLLING OR ROPING OF THE GOODS.

Difficulties.—It is likely that there is not a department in the whole mill that is so difficult to write about as the finishing-room. Whereas every process of manufacture requires men of good judgment to conduct it, much more depends upon wise discretion in this room than in the others; and especially is this true of fulling, scouring and gigging. Of all these, fulling is the most difficult subject to write upon. You may take to-day a rule to govern the fulling of a certain style of goods, and a month later the same style may work differently. I know of a mill, or, rather, two mills, owned by the same company, where the sorting of the wool and the dyeing and finishing are done at one place. The goods had to be fulled separately, and they did not work alike—I mean the same styles, made exactly in the same way, excepting that there were different carding, spinning, and weaving.

In order to give any definite rule for fulling a piece of goods, it would be necessary to commence in the wool-room and find out the kind of stock used; then the coloring and oiling of the stock; then to get a correct account of the cotton or shoddy that was mixed, also the weave; and by that time a man ought to be a first-class superintendent, instead of a finisher. I have spoken of these points, and of points before the cloth reaches the finishing-room, to show how difficult it is to give any general rule, and also to show what a finisher has to contend with outside of his room.

I once heard a superintendent of a large mill remark that he did not believe it made any difference with the finishing what kind of oils were used on the stock. That man has since learned a little, and has changed his mind. Finishers have had to work pretty close for the last two or three years, as buyers have been so critical and fastidious, especially in regard to shades; and it has been almost impossible for many to obtain what was required. One great trouble with finishers is that they get the selling samples out nicely and then fail to bring the goods out as well. There are several points that should be remembered in regard to this. Usually, when new samples are being made, the stock is all fresh. What I mean is, that it has not been lying around the mill any length of time, and it

works better, we think. We will improve our colors a little, and so we reduce our soaps. Next we gig a little slower, and put on a few extras, perhaps, and a few extra runs on the shears. When our goods come around, we have not got the time for extras. We need a little stronger soap, because the stock has been lying around, and the grease does not start so well. This is where many make a serious mistake.

Objects aimed at.—Now, I propose to show, or to try to show, as plainly as possible, some of the methods and some of the means of overcoming difficulties in fulling. I wish to dwell upon the difference in oils, soaps and alkalies, and upon flocking, shrinking, excessive time and heat, in fulling fancy cassimeres, medium and fine goods, cotton warps, or union cassimeres, flannels, etc., and to show how different weaves are liable to affect the fulling. Could I illustrate with sample to show what we have gained in the fulling mills, a much better idea could be given.

The purpose of fulling—An example.—The purpose of fulling a piece of goods is to shrink and felt together the fibers and threads that compose it. We will take for our first illustration a piece of all-wool cassimere, XX Ohio wool, spun about 4 to 4½ run, with about 3400 ends in the warp, 50 picks, 72 inches, on the loom, with a cassimere weave. The goods weigh from 18 to 19 ounces

off the loom. The finish-weight wanted is 16 to 16½ ounces. We do not care to flock them much, if any. We will say they shrink or lose 20 per cent. in finishing. This leaves us 80 per cent.; and 80 per cent. of 18 ounces would be 14.4 ounces. Calling the piece 36 yards long, we should have as many ounces in the piece as 36 times 14.4, which are 518.4 ounces; and as 16 ounces represent 1 yard or 36 inches of cloth, there would be as many inches to the yard left, after the 20 per cent. loss, as 16 is contained in 518.4 ounces, which are 32.4 inches. And the difference between 36 and 32.4 inches leaves us 3.6 inches, which we must shrink each yard, in order to make up the loss by the finishing process.

Sewing together.—We first prepare the piece by sewing the selvages together with the face on the inside, keeping them thus by tacking or sewing together with cotton twine, or old double-and-twist yarn that may be useless elsewhere. Even when the goods are not flocked, it is much better to tack them, as they will full more even. The sides then are the same thickness as the middle, thereby receiving the same pressure. The soaps cannot strike on the face more quickly in one place than in another. The face will not chafe or rub against the rolls or sides of the mills, and if the fabric be soaped properly, there should be no trouble in regard

to stains or spots where color is gone, or uneven felting, so far as this part is concerned.

Putting in the mill.—We now run the pieces into the mill and see that the ends are sewed nicely together, having a $\frac{6}{4}$ piece on each side of the mill. Commence putting on the soap slowly and carefully until the pieces are thoroughly and evenly wet down. After they have run about ten minutes, examine them and see if they are properly soaped. They should be moist enough so that, by wringing, a little soap and grease will start out, or by taking the piece and placing it over the fingers, the thumbnail, making an upward motion, will be covered with grease and soap.

We then let down the traps, or, rather, the clapper (so-called), putting several weights upon the rods, and let the goods full an hour or more. Then pull out the pieces and see what progress has been made, having before marked off a yard on the end of the piece with a piece of cotton twine. If they are coming up in width faster than lengthwise, add more weights; and if they are shrinking too fast, take off some of the weights. Try to have them come up together as nearly as possible, as they are liable to stay where you shrink them. They do not stretch out so much going over the other machinery. After the fuller has done a few pieces, he should

be able easily to control that part of the operation.

Soaps and oils.—About the soaps used for the goods we will speak later on. Much depends upon the kind of oils used in preparing the stock, and also the kind of soaps used make more or less difference. Usually where red-lard oil is used, six ounces of any first-class fulling soap, and two ounces of good soda ash, at the most, to the gallon, should be sufficient to start the grease and full even, and at the same time not destroy any of the colors, providing proper attention is paid to heat and excessive time.

Suggestions as to time.—The piece of goods made up, as I have before mentioned, should not full over three or three and a half hours. This time could be reduced if the mills were shut up close and the pieces allowed to heat; but this will not do. As many colors are spoiled by being heated, as by excessive alkalies. Many colors, in fact, stand the alkali best. It is always hardest to full the first sets, as the mills get cooled off through the night, and it is quite necessary first to get the pieces warm before the processes of fulling and felting commence. Of course, it is impossible to have the pieces cooler than the temperature of the room; but care should be taken not to get them too warm. I have seen pieces of a like style,

started at the same time, in the same kind of mills, where perhaps one mill would full, or even one piece in the same mill would full, from half to an hour longer than others. An inexperienced person would find it impossible to tell why this was; but on investigation we would find that on one side of the mill, or at the back of the mill, there was a draught from a window which was keeping the pieces cooler, preventing a quick operation of the fulling.

Now, these differences in heat, time, alkalies, shrinking both in width and length, must make a difference in the shading of the goods when finished; and it is only by long practice and a good system that these difficulties can be overcome.

I want my goods fulled even enough so that when I put four pieces on a rotary gig I shall have them all gigged alike. I do not want to gig awhile, take off two of them and give the other two more work. When I do this I am not working them all alike. I have hardly ever been obliged to do it, providing I had four of a like style.

Fulling fancy cassimeres.--Long fulling is being discontinued by many on fancy cassimeres. The place to make a piece of goods is on the loom. They have to make worsteds there. They do not depend on the fulling mills for a good, solid

piece of cloth. My experience has been varied in regard to this matter of fulling, and I have found that I have always been most successful when the goods were made on the loom instead of in the fulling mill; and in order to do this, the following system will be found beneficial:

Trial with samples.—Most mills make pattern-loom samples from two to five yards long and ¾ yard wide. I sew this upon a full piece and run it in the fulling mill as long as I think necessary—say from two to three hours. I then gig and finish it, comparing it with whatever effect in finish we may want. If it be all right, I make a note of every detail; and do the same with all of the pattern-loom samples. Then, when the rack or selling samples come along, they are usually about 6 yards each $\frac{6}{4}$ width, marked in orders. I keep each order until I get enough to make a full-length piece—say 36 yards. If I can get two, all the better, as that makes a mill full. I full them *precisely* the same as I did the pattern-loom samples, which came out all right. If I marked in my notes for any change, I make it now. If the selling samples come out too wide, then alter them at the loom. I full strictly on time, but always look out that my soaps and temperature are the same; that each mill is set up with the same friction, pressure, etc.; also that

the pieces are treated the same in soaping, shrinking, and that they are not pulled out on the floor and allowed to cool off while the fuller may be measuring others, or mending a belt, or attending to anything else. I will guarantee that if this method be followed, you will be able to gig four pieces of a like style together, and that there will be no trouble with different shades in this direction. It makes no difference whether you full a piece one hour, or two, or three, providing all are treated alike.

Possible difficulties.—Of course, there are many troubles that will arise. We will suppose that all is going well, and that the superintendent does not deem it necessary to inform us that he has made a change in his oils, or that he has worked into the stock some dirty waste, he supposing that if there is any trouble, the finisher is wide awake enough to discover the difficulty and smart enough to overcome it. Very likely he will; but not before he gets several greasy pieces, or some with an off shade, at the least.

Experiments with soaps.—Then again, a new soap must be tried. Perhaps it can be bought a little cheaper, or some other inducements are offered. Again we are liable to be off the track. Now, this is all wrong. I do not care whose soap you use. We all have a choice about such things. When you find a good soap, stick to it.

Buy of makers that can give you the same goods that were bought a year previous, and those that will give 16 ounces for a pound. You cannot afford always to be experimenting. If you are honest and upright in your business, and work with the superintendent instead of against him, let him know just how such things go. Do not think you know it all, and be afraid that some one else will learn something. When trouble comes, pull together, and you will come out all right.

Rolling or roping of the goods.—Another trouble in fulling is that of the pieces rolling or roping up in the mills. I have found this difficulty more in the old styles of mills than in the improved ones. I had at one time a class of hair-lines that it was impossible to keep from doing this. They had to be flocked, and shrunk about 4 inches to the yard. If I flocked them dry, they fulled so long that they were tender. If I flocked after they were wet down, they would be so badly twisted up that the flocks only took on where the piece was exposed, and the sides which were rolled up inside would be thin and light Not much felt and not any flocks could get to them, they were rolled so tight, leaving the middle all exposed to catch all the flocks and felt. I tried everything I could think of to prevent this. I had them taken out and all un-

twisted and straightened; but in less than five minutes they would be as bad as ever.

Then I began in another direction to find the cause of the trouble. Having had some two years' experience in the weave and designing-room, I dissected a piece of the goods, and found that it was woven one pick on the face and one on the back. The backing filling was spun coarser than the face, so in reality the picks were in firmer on the back than the face; and the face of the piece fulled or shrunk faster than the back, which made them roll up. This was actually so, and the designer could not dodge it. Neither could I in the fulling mills.

When this trouble is caused by the mills, you will usually find that the rolls are very much out of true, and should be taken out, put into a lathe and turned down. If the top and bottom rolls are geared together, be sure that they are both turned the same size. or you will get damaged goods.

CHAPTER III.

COCKLES: FLOCKING.

CAUSES OF COCKLES—HOW TO PREVENT THEM—STRENGTH OF ALKALIES—FAIR ALKALIES MUST BE USED—VARIOUS METHODS OF FLOCKING—DRY FLOCKING—RULE FOR FLOCKING—HEAVY FLOCKING—SOAP AND ALKALI—POINTS ABOUT ALKALI—SCOURING BEFORE FULLING.

Causes of Cockles.—Cockles—another enemy with which we have to deal in finishing—may be made elsewhere than in the fulling mill, but they may also be made *in* the fulling mill. Uneven soaping will do it. Having the pieces run too dry, or too weak a soap, will also make them; for where the soap goes on directly, the grease will start; but the parts that have to depend upon soap, by absorbing from the more moist places, will not get enough to start the grease; therefore the piece fulls uneven. I have at times been obliged to use as much as 4 ounces of soda ash to the gallon before I could full them even.

Then, again, the soap is used just on the line, we will say. A lot of filling gets mixed up; some may have been lying around for a year; with the same oil, or perhaps a different

one, it will make cockles, as the new stock will start first, and perhaps the soap is not strong enough to start the other at all.

I will give a few experiments in the use of different oils. I cannot give the makers' names, but would say that the soap was used in the proportion of 7 ounces of soap and $2\frac{3}{4}$ ounces of soda ash to the gallon of water.

Experiments.—Piece A had one brand of red-lard oil. It fulled $2\frac{3}{4}$ hours. The grease did not start, and it fulled uneven.

Piece B had a different brand of red-lard oil. It fulled $2\frac{3}{4}$ hours. The grease started thick and muddy, but the goods fulled uneven.

Piece C had a mineral oil. It fulled $2\frac{3}{4}$ hours. The grease started well, and everything worked well. It fulled even, and it handled good throughout the works.

Piece D had a saponified mineral oil. It fulled $2\frac{3}{4}$ hours. The grease started fairly, though not as good as C, but it fulled even.

Again, these same oils were tried in a neutral soap, 6 ounces to the gallon of water.

A gummed up, fulled $5\frac{1}{2}$ hours, and had holes burst through it similar to knife-cuts.

B gummed up badly. It fulled $5\frac{1}{2}$ hours, fulled hard, and had the same kind of holes.

C worked well, kept moist all the time, fulled $3\frac{1}{2}$ hours, and fulled easily and free from holes.

D worked fairly, but dried up at the last. It fulled 3¾ hours. Did not work as well as C, but was free from holes.

In regard to using red-lard oil, I do not wish to have it understood that there is no oil of this kind that can be used successfully. Many poor red-lard oils have been put upon the market, and they have caused manufacturers much trouble, but there are good brands that work all right. I have met with success with red-lard oil and again I have failed to accomplish good results.

Strength of alkalies.—Next I will give illustrations of the different strengths of alkali, and the time in the mills, to show what effect there is on the colors of silks and wool:

A. Two pieces, 20 yards in each; 6 ounces of soap; 2 ounces soda ash to the gallon. Fulled 4 hours; 56 inches wide; shrank 4 inches to yard; 72 inches on the loom.

B. Two pieces, 35 yards in each; 6 ounces of soap; 2 ounces of soda ash to the gallon. Fulled 3 hours; 58 inches wide; 3 inches shrinkage; 72 inches on loom.

C. Two pieces, 35 yards in each; 7 ounces of soap; 1⅓ ounces of soda ash to the gallon. Fulled 6¾ hours; 56 inches; shrinkage 3 inches; 72 inches on loom.

D. Two pieces 35 yards in each; 7 ounces of soap; 1 ounce of soda ash to the gallon.

Fulled 7 hours ; 56 inches wide ; shrinkage 3 inches ; 72 inches on loom. A little uneven and inclined to be cockly.

Fair alkalies must be used.—These tests show that a fair alkali must be used in order to full quick and even. Those that fulled the longest, and had the least alkali, were not as good as A and B. B was just a trifle better for color, but not so good a piece, for it was not up to width. These pieces were all of the same style, and the oil used was a mineral oil, with Crown soap. But I have found by experience that better results have been obtained, with the least amount of alkali named, by using a prime white-lard oil.

Various methods of flocking.—Now, in regard to flocking, there are various ways in which to perform this operation. It depends considerably upon how much weight has to be made up by flocking ; also upon how long the pieces are fulling, and what is the condition of the flocks. I have used, on fine goods, all clean shear and gig-flocks, taking a half shear, the other half gig, and grinding them fine, then mixing 50 pounds of these with 25 pounds of uncut shear-flocks. They do not sift out of the goods as much as by using all cut flocks. The staple being longer, it felts with a nap on the back and helps to retain the fine ones.

Dry flocking.—Dry-flocking is detrimental to quick fulling, although where 3 or 4 ounces have to be made up in flocks, it is almost impossible to get them heavy enough without so doing. Then, again, the flocks can be put on more evenly. The pieces do not flatten down so much as when wet, and if run for 15 or 20 minutes, every part of them is liable to be covered.

Rule for flocking.—As for a rule for flocking, I would say: Try a piece; give it so many ounces to the yard—perhaps part dry and the rest of them after they have been wet down—and run for an hour. If you get it right, make a rule by this trial. For instance: The piece weighs 26 ounces. Take 30 ounces for a standard. Find the difference between the two, which is 4 ounces. Multiply the number of yards in the piece by 4 ounces and divide by 16 ounces, and this will give the number of pounds to the piece. If the next weighs only 25 ounces, then, of course, we need more flocks; but by finding the difference each time, especially when there is much variation in the weight or yards, we form a system by which each gets a proportionate amount each time, and at the same time the operator must adapt his method to the goods, the machinery and the flocks he may have to use, and be governed accordingly.

Example in light-weight goods.—I will give an example of flocking in the case of a piece of light-weight goods, cotton weave. They fulled hard, and weighed but $6\frac{5}{10}$ ounces off the loom. Finish-weight wanted, $6\frac{5}{10}$ to 7 ounces. If I flocked dry, they would full all day; so I let them run until they were within two inches of being up to the required width. Then I put the flocks to them, about 6 ounces to the yard, and got them out in 4 hours, and up to weight. There were more or less waste flocks from the mills, but these we dried and ground over. It took nearly twice as many this way as it would have done had they been flocked dry, and a third more than if I had put them on, the first thing, after wetting them down with the soap.

Various goods flocked.—Some Scotch goods which I once had, I flocked just as soon as they were soaped. They weighed 10 ounces off of the loom. Finish-weight wanted, 13 ounces. I put on about 10 ounces to the yard; $\frac{6}{4}$ width. They fulled $3\frac{1}{2}$ hours, and came out plenty heavy enough. It was much easier to get the weight of these than that of some Meltons that were in the works at the same time. They weighed one ounce more off the loom. Finish-weight wanted was the same. They fulled 3 hours, and were flocked the same; but, inasmuch as they required more gigging, it was not so easy to get the weight.

Flocking some union cassimeres that weighed 23 ounces off the loom, finish-weight $26\frac{5}{10}$ ounces, I put on 12 ounces dry, ran them an hour after wetting down, and put on 4 ounces more. Then, an hour later, I again put on 4 ounces more. The only guide we could have on the goods was to tell by the feeling. If we thought they were not heavy enough after putting on 20 ounces to the yard, we added more, until we arrived at the right point.

Always have the same grade of flocks, if possible, and always have the pieces in the same condition when flocked. If you do not, it will be almost impossible to get them even in weight.

Heavy flocking.—Where goods have to be heavily flocked, it is a good idea not to remove all the waste of the previous set of pieces, so that this waste may help to fill up the corners and crevices of the fulling mills. This will effect a saving of quite 40 per cent. of the new flocks. I have long pursued this plan and I find that I can actually make such a saving every time.

Soap and alkali.—Next, soap and alkali perform an important part in fulling, and it is very essential that they should be uniform in quality and strength. Many use the alkali-tester, and try each tank of soap; but, as I never have been able to purchase one that did not require the test to be made at 60° temperature, and as I have

never been able to do this with my fulling soap, I should have got just as good a test by sticking it in a tank of mud. With soap having body enough for fulling at 60°, I could make it stand 1° or 40°, as I chose. As I have said before, purchase your soap of a reliable company that will always give an even article. I have used, I think, every make of soap in the United States, and there are many good ones, and many in which there is no material difference. I first find out how much my soap-tanks hold by squaring the diameter or multiplying the diameter by the diameter in inches. Then multiply by the depth in inches; then by .0034; point off the decimal in the product, which will give you the gallons. In making my soap, I boil just enough to dissolve it thoroughly. A tallow-chip soap will need boiling from 4 to 5 hours; but an ordinary soap needs but about 2½ hours, stirring well while boiling. Then add the alkali, which it is best to dissolve in a separate barrel or tank, to prevent any hard substances from getting into the soap. Then fill up with cold water, and stir occasionally while filling. Let this remain until perfectly cool.

Curdling Soap.—If the soap curdles after being properly cooked or boiled, see if the hard soap is all right. If it is not it will usually look streaked, and the ingredients will not be properly

mixed. It is wholly unnecessary for me to say more in regard to the strength of soap to use in the fulling mills. I have given examples of different strengths. Use it as light as possible; at the same time start the grease well.

Points about alkalies.—If in buying alkali it is impossible to get the same brand, take one pound of soda ash with a quart of water, dissolve, and see what it stands. If you wish, each new lot can be tried in the same way.

In regard to the different kinds of alkalies, I would say that I have used pure alkali, sal soda, salt, etc., but A No. 1 soda ash is good enough for me. Many say that sal soda, being a milder alkali, does not make the goods so harsh. There are other places in the finishing-room to make the pieces harsh besides the fulling mills. I have taken, when a large quantity of alkali was used, sal soda, but did it because I had a quantity on hand—as much as for making the goods feel soft. It takes about 2¾ ounces of sal soda to stand the test of 1 ounce of soda ash.

Thin liquor for scouring soap.—For a scouring soap I prefer a thin liquor. I have used the same as I did for fulling, and was successful. I usually make up a tank, say, of 200 gallons. Use about 75 pounds of some good scouring soap and 50 to 62½ pounds of soda ash. Then reduce it to whatever strength is necessary by

taking it out into a barrel. Then fill up with water, perhaps one-half soap and one-half water, or 12 soap and 6 water—whatever is needed. In scouring woolens, I usually put plenty of liquor on, but use it as weak as possible. To 4 pieces, put on a barrel of liquor made by reducing the above one-half soap and one-half water. I would run these 20 minutes in soap. Then let on a little lukewarm water—enough to thin the soap somewhat. Run 5 minutes; then open the gates to the washer and let on a little more warm water. When they have drained off pretty well, give them a little more warm water. Then rinse 45 minutes. Where the pieces have been very dirty, I have first rinsed them off in warm water, then soaped them as before, and taken the above-mentioned time to run in soap and warm water.

Scouring before fulling.—If I scoured any of my goods before fulling them, I first wet them enough to make them all moist, then added enough soap, say, half a barrelful, to start them well. They would scour fully as hard as if they had been fulled at first. I have also had goods on which, after they had run about ten minutes, the soap would be all neutralized. I would then rinse this off with warm water and put on more soap. If the grease is well started in the mill, and you raise a good, clean lather in

the washer, there is not much to fear in the way of cloudy goods, or those that will smell after being finished.

Sometimes, when it is necessary to return pieces to the washer, and have them rescoured, care should be taken that the soap is strong enough and of heavy body, as it will be liable to die out, turn watery, and then it will be an impossibility to get them free from odor.

Bur, or speck-dyeing.—We next have bur or speck-dyeing, which may be done in several ways, on cheap classes of goods, in the fulling mill; but I do not consider this the proper way, and I never used it so but on satinets.

A good dye can be made thus: 200 pounds extract logwood, 110 pounds soda ash, and 50 pounds blue vitriol. This makes 200 gallons of dye that stands about 10°, which we reduce to whatever strength is required to cover the specks. Boil in sufficient water to dissolve thoroughly the ingredients, boiling the logwood and vitriol together. Then add the soda ash liquor. Boil as quickly as possible—from one to two hours, sure. Stir well. 3° should be plenty strong enough to cover the speck under ordinary circumstances; and it should be a dark plum color. Take a pine stick and let it remain in the dye a minute. If the shade is too red, it needs more blue vitriol; if too blue, add more soda ash.

From the fulling mills put the goods into the washer and raise well with soap. When they have run about 10 minutes, if they lather nicely, add 2 pails of 3° dye to each piece, running them in soap and dye 20 minutes. Then rinse well with cold water—say 45 minutes.

Another method.—Another way is this: After you have scoured and rinsed well with cold water, add 3 pails of 2° dye to each $\frac{6}{4}$ piece. Run them 10 minutes and rinse 45 minutes. When taken from the gig—which is the best way to bur-dye—use about the same as the others, although $1\frac{1}{2}$° would be enough ordinarily; for, as soon as they are done, they can be extracted and dried, whereas, with the other way, they have to lie around wet perhaps two days or more. Then again, the teasels in the gigs wear off much of the dye; and there are other troubles which come under another part of the wet finishing, and which make it much more desirable to dye this way.

Blue cast on mixes.—Where a blue cast is required on mixes, I have at times achieved this by making a dye of double the quantity of blue vitriol and taking as much off of the soda ash. It is the vitriol that colors the wool; therefore use as little as possible; but at the same time keep a good color on the specks. Always test your dye before using. Put on even quantities,

and always use it stone-cold, and you will not be troubled with different shades by bur-dyeing.

Bur-dyeing union cassimeres.—Having some light and heavy weight cotton warps, wool filling, or union cassimeres, I tried to use the bur-dye that I used on all-wool cassimeres before I gigged them. But it required so strong a dye to cover up the specks that it gave a red shade to the goods, although the cotton and specks showed a blue shade. It seemed to affect the wool ; and as many of the colors had more or less cotton in them, the whole appearance was changed. I then used the following formula and found it was a success:

Goods bur-dyed after they were gigged:
175 lbs. extract logwood.
140 lbs. soda ash.
90 lbs. blue vitriol.

This makes 200 gallons of dye that will stand about 15°; this I reduce to 2° for dark colors and 1° for light shades, putting on 2½ common pails of dye to each $\frac{6}{4}$ piece, running from 10 to 15 minutes in the dye and rinse about 20 minutes. If the goods crock any they should be rinsed longer. This depends on how good a stream of water one has to the washers; but I find with this formula that they can be rinsed very easily, much more so than by No. 1 recipe.

CHAPTER IV.

GIGGING.

PURPOSES OF GIGGING—NEW AND OLD GIGS—ALL-WOOL CASSIMERES—VARIOUS STYLES OF FINISH AND METHODS OF PRODUCING THEM—FANCY COLORS—THE TEASELS—GOODS WITH A TWIST—TENDER GOODS.

Gigging.—Gigging is a process of raising and straightening the felt and burls produced by fulling, and when they are thus raised they are called the "nap." Various effects in finishing may thus be produced. Different weaves, stock, and combinations have to be carefully regarded at this point of the finishing of woolen cassimeres. It is very essential that this process should be properly performed, for it is impossible to remedy defects on any of the machinery subsequently used.

Of course a piece can be re-gigged after it has been sheared, but the result will hardly be the same, and there is more or less danger of injuring the goods.

New and old gigs.—There are various kinds of gigs in use; but the same results can be obtained from almost all of them, from an old style up-and-down, a single cylinder rotary, or a double cylinder rotary gig. I have often heard

old finishers claim that a better finish could be obtained from the old style gigs, as they thought they could regulate their friction better; but I do not see the philosophy of this assertion, and I know by experience that the new style machinery will do the work as well as, and quicker and easier than, the old. A piece of goods for the gigs should not be exceedingly wet, neither should it be dry, but just moist enough to insure that the flock will not fly about the room. Therefore when the fabrics come from the washers, they should be extracted in a hydro-extractor, say four or five minutes. Then put them on a rolling machine with stretcher attached, to remove all wrinkles and straighten the listing if it be curled up, rolling them tightly and evenly. When rolled, lay them down flat upon a bench or rack. Some prefer to stand them on end, but I have always found more or less trouble with uneven moisture. Even when the ends were reversed, the one which was at the bottom last, was liable to be more moist, and this being the case, uneven gigging followed, as the nap on the dry side would not straighten out as well as that on the wet.

Illustrations.—It is impossible to give a general rule for gigging a piece of goods, but a few illustrations may supply some instructive ideas.

The principles of gigging are the same, no matter which kinds of gigs are used. It is always essential to commence with teasels that are somewhat worn, or "old work" as it is usually called, for a new teasel at first only injures the fabric and the finish required. Always bear in mind that much depends upon the time employed in fulling; and I here claim that goods that are fulled on time can be more evenly gigged than those that vary.

All-wool cassimeres.—We will first take a set of 4 pieces of all-wool cassimeres, made of single yarns, fulled two and one-half hours and shrunk 3 inches to the yard. They are firm and quite well felted. We will illustrate on a double cylinder gig. The finish required is close, but not like a worsted. The nap is to lie so that it will be impossible to feel any spring. At the same time the threads must be full and plump, and every one visible, to show the pattern nicely. We first fill both cylinders with "old work" and run one hour. Then turn the slats over and run one hour. Then put 10, or just one-half of each cylinder with a grade better work. We will call them 2's (twos). Run one hour, then turn them over, reversing those in No. 1 cylinder or in front. Put on a straight belt, or reverse gears, so that both cylinders will work the same way and run one hour. Then take out the 2's

and replace the "old work," and, with a very fine perforated pipe, sprinkle the goods for thirty minutes. Then take off and put them on what is termed a wet or moistening gig, which has a trough of water directly under the bottom roll. Give them three or four runs and extract well. After they are dry give them two runs on the dry gig. This makes one of the finest finishes that can be produced on a fancy cassimere.

First gigging may have to be increased.—The first gigging may have to be increased, as this would depend on the fabric; but after they have been gigged enough, the water finish is added. I will guarantee that it will more than repay the labor expended, as the goods will always give satisfaction. There will be no complaints of the goods catching lint, roughing of the nap, or having that dry and harsh feeling which the trade objects too. And it is at this point, in my opinion, that more harm is done, and more harsh, dry, crisp goods are made, than by the soda ash used in the soaps for fulling and scouring.

If the goods are gigged too dry, they will feel so when finished. When I make this assertion, I mean goods that full from two to four hours. For instance: I once had some fancy whip-cords or cork-screws. A very poor black was used. It stained the silk which formed the stripe. They fulled three-quarters of an hour. I dried

them, and gave them two hours on "old work," and a half hour straight belt. They looked well and gave perfect satisfaction in the market; but I think they were the only goods I ever handled that did give satisfaction worked in this way.

Different kinds of finish.—For a velour finish, I should work in the same way as in the first illustration, although the goods should full longer, and thus they would need, perhaps, a better class of "work" or teasels and should be run longer with the straight belt.

A melton finish.—For a melton finish, the method is, of course, different, for the goods are not to be cleared out, neither is the nap to be long and lie flat, but it is to be more like a piece of velvet. To obtain this, if the piece is made of slack twist, which it should be, give 4 pieces two hours on "old work" with the same grade of teasels in both cylinders and the cloth touching both the same.

If goods full long and have considerable felt in them, it will be necessary to have more than two grades of teasels. I have gigged some that fulled six to seven hours in this way: One hour "old work," one hour 10 twos, each cylinder; one hour 10 twos turned. Then put in 10 threes (or a grade better), and run an hour. Then to the back cylinders add 5 sharps or

breakers, and run from one-half hour to one hour as may be necessary.

A doeskin finish.—For a doeskin finish, we will illustrate on an old style up-and-down gig. Two pieces of black doeskins, made of good fleece wool. They full from ten to fifteen hours. Fill the cylinder with "old work," give them 6 runs, reverse the cloth and turn the slats. Give 6 runs, reverse the cloth and fill the cylinder with twos. Give 6 runs, reverse cloth and slats; then 6 runs more; fill again the cylinder with threes, give 6 runs, reverse the cloth, and slats; give 6 runs more; then remove the piece from the gig, and, after having the goods back-burled, put them on the shear, if they are to be finished so that the twill or weave is to show crop-close. If this is not desired, blur, or leave the nap long. Put them back on the gig and give them a run or two on the same "work" that was used before the cloth was taken off. In the meantime, sprinkle them evenly with water, with a watering pot or a whisk broom, as they will be too dry after shearing for successful gigging. Then fill up with fours, give 8 runs, reverse the cloth and slats and give 8 runs more. Then put in about 6 sharps, or breakers, giving from 6 to 10 runs, which will usually be sufficient. Then put them on a wet gig, give them 2 runs, run them off on a roll, put them into a steam or water-box

and boil eight hours. Take them out and let stand until perfectly cool. Put on the wet gig again, give them 2 runs and reverse the ends when put on to the roll again. Repeat this operation of steaming two or three times, and more, if convenient, always reversing the ends of the pieces to keep the shades even and to keep both ends alike. Then, when thoroughly cool, put them in the washer and rinse well with cold water.

After they have been colored, put them on the gig and straighten out the nap nicely, say three or four runs. Extract well and dry. If dried on the bars, take a hand-brush and smooth out any place that may have become roughed up by tentering ; and when dry they will be ready for the shear.

Mixed doeskins.—For mixed doeskins, change the gigging somewhat. They full the same as the blacks excepting that one is scoured before fulling while the other is fulled in the grease. Gig them the same up to the fours, crop and again the same as the blacks. Then dry the pieces and crop again. Put them on the gig and give four or five runs. Then put them on the brushing machine and give them two or three runs, at the same time giving them a little dry steam. Then press hard.

After this run them on the wet gig so that they may be rolled for the steam box. Lay

them in the box flat, on cleats nailed to the box, taking precaution that they do not touch each other or the sides of the box. Steam six to eight hours; take them out and cool; put on gig two runs, reverse the ends of the pieces, and when taken out to cool, be sure and reverse the ends of the rolls or the colors will be uneven.

Steam again eight hours with the leader or ticking used to sew the pieces on the gig, wrapped round the roll. Take out, and when perfectly cool, put them in the washer, and wash with fuller's earth, one pail of the earth to a barrel of water, and enough of this to wet thoroughly the pieces. Then give them a few runs on the wet gig. Extract and dry.

Fancy colors.—Fancy colors, such as oranges, lavenders, mixes, etc., will stand about 140° dry steam. Blacks, or black and white mixes, will stand either wet or dry steaming. If dry, lay them on cleats; if boiled or wet steamed, stand them up squarely in the box; 180° will not harm them.

Scotch goods.—For a finish on Scotch goods that fulled about four hours, and were heavily flocked, "old work" in both cylinders, cloth striking each the same. Run a half hour only, but have the peculiarity of the finish made on the shear.

Hair-line finish.—A hair-line finish on cotton warps, illustrated on an up-and-down gig: Cylinder filled with "old work"; six runs; reverse slats and cloth; six runs more; reverse cloth. put in the twelve twos, give six runs, take them off and crop say half way down. Put them on the gig again, give six runs, reverse cloth and add six sharps or breakers. Give twelve runs. The goods full six hours and are heavily flocked. Finish required is clear, but soft and velvety.

Fancy cotton warp finish.—A fancy cotton warp finish, all cotton, filling all wool: Six runs "old work"; reverse slats and cloth; six runs, again reverse cloth, add twelve fours, give ten to eighteen runs, as may be necessary. The goods full five hours and are heavily flocked.

Worsted finish.—In a worsted finish the goods should not have excessive fulling. Raise the nap slowly at first with "old work." Then gig them one way. It may be necessary to put in 10 twos in the finishing cylinder. The more they are worked one way, the higher the luster that will be obtained.

Care must be taken not to streak the goods. Always use a fine teasel. If using iron slats, have them set with three rows. If set properly they should break joints, or the same as shingles are put on. Also see that they are all of the same size.

The teasels.—In order to keep the teasels, or "work," as it is called, always the same, some system should be used, in adding new slats, and at the same time, not to alter the finish of your goods. I have always found the following to work well, although this might possibly be improved upon.

Goods with a twist.—If you have goods with twist in them, or a good strong fabric, work in breakers or new teasels when finishing up, so as to have plenty to throw into fours, or sharps, for more delicate goods that may follow, which will not require as good work to finish up with. Take three slats from the fours you have been using, and lay aside until there are nine thus thrown out. Then take nine from the finishing cylinder, and replace them with the old fours. Then take from the first cylinder's nine, and replace them with those taken from the finishing cylinder. This leaves nine slats rejected, which should be reset with new teasels, always taking the poorest to change from one to another. It is not safe to work in more than three sharps or breakers at a time, unless it is a 24-slat cylinder; then I should use four at a time; but in an 18-slat cylinder three are enough. Always have them divided evenly; and put on the brakes gradually, not all at once. Even if the goods will stand such treatment, it only breaks down the points of the teasels.

Practice needed for good work.—I wish all of the readers of this article to understand one thing, and that is this: I do not claim in any of the above illustrations, that they can put a piece of goods on the gigs and give it just so much time or so many runs, and have the piece gigged all right. This can only be determined by practice and judgment. To find out when a piece of goods is gigged nearly enough, take the goods firmly over the fingers of the left hand, and, with thumbnail, part the nap. If the threads look clear, and show up round and full, they are nearly gigged. Or a pen-knife inserted under the nap, if it enters freely, will give you an idea, with a little practice, as to about what condition they are in; also what we term the "feel" or handle of a piece of goods makes another guide to go by. They should feel pliable and soft and the nap lie smoothly and straight.

Tender goods.—One more thing I wish to say before drawing this chapter to a close: It is in regard to tender goods. Many are made on the gigs; at the same time it may be necessary to make them so, in order to obtain the finish required. If a worsted finish is wanted, and the goods have fulled eight or more hours, I defy almost any man to obtain it on single yarns. When a certain finish is required it should be regulated before it gets to the gigs. Always

look and see that your goods are strong before they go on the gigs. I have seen goods that had all double and twist filling which were like pulp. After fulling four hours it would be impossible to gig them at all and have them strong. Tender goods can be caused by tender wool, by using an excessive amount of sulphuric acid in the dye-house, by the wool being cut on the cards, by not having enough twist in the yarn, by long fulling, and by excessive gigging. Always see that the fulling and gigging are properly done. Then, if you have tender goods, look elsewhere.

CHAPTER V.

DRYING.

DRYING MACHINES OR TENTER-BARS—THE BEST METHODS OF DRYING WORSTEDS AND WOOLENS—PRACTICAL HINTS—TROUBLES WITH THE FLOCKS.

Drying machines or tenter-bars.—When woolen or worsted goods come from the gigs they should be thoroughly extracted before putting them on the drying machine or tenter-bars. There has always been more or less discussion as to which is the better way to dry goods. Many claim that a piece of cloth will look and handle better dried in the open air, on the tenter-bars, than on a drying machine. I have never been able to discover the superiority of one way to another. I have employed both methods with the same class of goods, and also on very particular work. I have used several different styles of drying machines, but not all of them; and I prefer a first-class machine to tenter-bars for almost all classes of goods, and for several reasons. Take a large mill that will produce from twenty to thirty 6–4 pieces per day on fancy cassimeres or worsteds. One man with a machine and good steam will easily dry these, and I have dried from forty to fifty pieces per day.

This work is all done by one man. He is responsible if the goods are damaged by negligence. They are more likely to come out uniform, both in width and the natural stretching they receive lengthwise. Then, again, if it should happen (which it often does) that there is a hurry for any particular style, it does not take more than fifteen or twenty minutes to dry a piece, whereas on the bars it would take possibly half of a day before the fabric would be ready. I consider it fully as cheap, if not cheaper, to dry on a machine as on the bars out of doors, and the goods will look as well. There will be many readers of this article that have not forgotten the time (and many that are obliged to do it now will best realize how pleasant it was) when it was necessary to shoulder a wet piece of goods and start out for the tenter-bars with the mercury below zero. It is by no means agreeable to leave a warm room to do this work, but it must be done just the same; and after the fingers have become almost numb with the cold, the workman may accidentally receive a cold tenter-hook in the ball of the thumb or finger. I know just how pleasant this is. I have been through the experience, and if I had followed it up much longer, I doubt if I should have been a finisher.

Tentering.—One man stands at the head of the bars and hooks on the end of the piece, while

another carries it along; still another placing it on the arms or pins at each upright post, keeping it all straight. When they come to the end they pull it up taut, that there may be no slack or wrinkles throughout the piece. I usually put the face of the goods inside or next to the bars, as it does not rough the nap up so much as it does with the other side out.

A patent tenter-hook has been produced, or rather a clothing, which comes in strips of ten or twelve feet, which consists of a steel wire driven through from the flat side and coming out on a bevel of this strip of wood. This is firmly nailed on to the bars, and for durability and convenience I never have seen its equal. When stripping the bars of the goods, they come off much easier and are less liable to damage the piece than the old style of hook.

Then, again, one can tenter about twice as fast. One great inconvenience, where there is not work enough to keep two men busy all of the time, is that it is often necessary to take out most of the force in the wet finishing-room. This rather demoralizes things, and not as good results are obtained.

The dry-house.—I now have a large dry-house, two stories high, with a large cupola for ventilation. Two rows of inch-and-a-quarter steam pipe go the whole length of the bars. One, six

inches above the lower edge of the cloth, the other about twelve above this. We put a piece on each side of the bars; this encloses the heat. I have been able to take off three sets of pieces per day. We run an independent boiler for heating, which enables us to have steam and enough of it whenever necessary. Two men do all of the work, and the production is about 6,000 yards per week as 6-4.

Troubles with flocks.—One disadvantage which has been claimed by several manufacturers (although it might have been more the fault of the finisher), is that of drying union cassimeres that are flocked heavily and have more or less cotton mixed with the wool; it is almost impossible to dry them fast, or rather as quick as they should be. On the drum cylinder dryers, when the radiators or coils of pipes are enclosed within the drum, the flocks, dropping from the goods, soon fill them up and prevent the heat from escaping readily. I never have had any trouble of this kind where everything was kept clean and I had all the steam I wanted. One trouble I did have once, and which may serve to keep some one out of difficulty, was the damaging of the goods on the side. When they were going over the stretchers there would be small three-cornered holes made by blocks. This I easily remedied (when I found out what the trouble was) by setting

the receiving roll just as close to the drum as possible, then setting the stretching blocks up as close as possible to the receiving roll. It is very simple after one knows how, but I have seen many finishers bothered by this simple affair. Dry your goods as quickly as possible; do not let them stand and bake, and I will guarantee they will be just as good dried on a machine as in the open air. Get your goods clean, and that will do more towards improving the feeling and appearance of the cloth than the difference in the modes of drying.

CHAPTER VI.

SHEARING.

BACK-BURLING—THE SHEARS—DON'T TINKER AT THE SHEARS—DIFFICULTIES—ARRANGING THE SHEARS—GRINDING, ETC.—OILING THE SWAB FREQUENTLY—REFUSING TO CUT—SHEARING THE GOODS—SHEARING.

Back-burling.—Before the goods are put upon the shear, they should first be carefully back-burled. See that every bunch and knot is removed. Do not take the burling-irons to remove them, but with the point of a pair of scissors, carefully raise the bunches or knots and clip them off. If the irons are used, there is a liability that too much will be taken out. This only makes work for the sewers, and it is not the proper way to remove them.

When the goods are put on the shear, care should be taken to make a good, fine sewing. The saving on the ends will more than repay for the time it takes to do this, and it will enable the attendant to finish the ends of the piece as nicely as the middle, whereas if a poor sewing is made, the goods will be all streaked for a yard or more.

Setting the screws.—Set the screws or notches on so that you just trim the nap lightly. On a heavy-weight piece 24 notches are none too many

to set off, and after giving the piece a run let down two or three, and so on, until they all have been let down. Then give the piece five or six runs to smooth it nicely. Of course any piece of goods with a thin or short nap, would not require so many runs; but fancy cassimeres, unions and doeskins, that full from three to five or more hours, should all be cut very slowly, for then they look better. The face will not look as though half the nap were pulled out, and what was left dragged and pressed down over the other colors, looking like so many spider legs. And, moreover, your shears do not need grinding so often; and the less grinding done the better, for every time a shear is sharpened chances are taken of its getting out of true.

The shears.—Of all finishing-room machinery, the shears need the most particular attention. Not only is it necessary to have them started up right, but they require a constant supervision. A little neglect on the part of the attendant will undo in a moment that which will require hours to remedy. Neglect to oil the swabs will soon draw the temper on the ledger blade or at least will soon rough it so that the cutting quality will be spoiled, causing them to rattle and ring. Neglect to oil the revolver-bearings will soon wear them out, as the revolver runs fast, making from

900 to 1000 revolutions per minute, to say nothing of the minor troubles, which will arise unless well looked after.

Don't tinker at the shears.—At the same time I have often thought that too much, as well as too little or not enough, is frequently done around the shears. Some are never satisfied unless they are tinkering half of the time. If a few pieces of goods come along and do not shear out perfectly even, away they go for a file, or a wrench, and everything has to be changed. Not half of the time do such men know why they make a change, but one must be made, so they try this thing and that to see if it does not help the matter. Nine times out of ten, the trouble is not with the shears but is really caused by uneven fulling, or flocking, poor listing, too tight or too loose, bad work on the dresser, or by numerous other things, which cannot be made right on the shear, even if it be working to perfection.

Find the cause of the trouble.—There are troubles to be sure, that belong to the shear, such as poor brushes or when the brushes are set uneven by imperfect friction on the cloth, the blades not cutting, the carriage set too high or too low, the rest loose, streaks made by the brushes being filled up with greasy flocks, and also made by rough places on the revolver causing the oil to

flow freer from the swab, or by a poor swab, or uneven oiling of the same; also by an uneven blade. But with all of these difficulties, we must first find the cause. Filing the rest, or grinding out the ledger blade, will not remedy the defects made in some of the other machinery, for should we fit the shear for the imperfection of some other machine, when we did get a piece right our shear would be as far off as ever; and we should again have to tinker, to get it right.

Above all things, never file the rest, as it is impossible to replace that which has been removed. If the rest be out of true, send it to the shop and have it put in order. Then leave it so.

I admit that there are difficulties which will arise, that require good judgment and patience to overcome them; but don't have a "howling" shear in the room.

Arranging the shears.—We must first take into consideration, that every machine should be placed on a solid foundation and set perfectly level, and especially one that runs as fine as a shear. To begin with, see that the frame sets solid and level, that the brushes rest and carriage are level, and in their proper place.

We will suppose that we go into a new shop and find that the shears are working badly, that the ledger blade is about worn out, that the revolver or fly blades are out of true, and that the bear-

ings of the revolver are badly worn, but the rest we find is perfectly straight and true. We first turn down the bearings, and fill the boxes with Babbit metal. Then put the revolver upon a grinder, traverse, or solid lead cylinder, and grind until it is perfectly true. If the revolver is hollow or smallest in the middle, set both ends up carefully so that they just touch, and grind slowly until the hollow place is reached. Even then grind until a keen edge is obtained all along the revolver. If the middle should be the fullest, set it up to the cylinder so that it just touches, being careful not to set one end up faster than the other. Grind until a keen edge is obtained all along.

Then remove the revolver, and replace it in the bearings of the carriage. If the ledger blade is not so far gone that a new one is required, place this on the grinder, and what we term, *face* it, or make a new, broad bevel on the front of the blade, striking back somewhat on the old bevel, so that when the edge is reached the bevel will not be so short as to prevent a free operation of the cloth between the rest and the blade. Place the ledger or blade-bed into the carriage, and with the lower middle screw raise it until you have obtained about the right pitch. Then with the upper middle screw, draw the blade up to the revolver until it just touches. Then bring

the ends up in the same way, and tighten the screws midway between the center and ends.

Next see that the blade is parallel with the revolver, and nearly up to the center. Most manufacturers now put a center-mark on the revolver, so that it is quite easy to set the blade even. But if this is not done, center the boxes, marking them on the inside. Then set them midway of the screw that operates them up and down; with a straight edge or rule place it on the face of the blade and even with the edge, extending it out to the arm of the carriage. Then with a rule kept parallel with the center line made on the box, measure down to the rule on the blade.

Or take a try square; put the thick part in the box, and with the thin edge kept parallel with the center mark, with a rule on the upper edge of the blade, extend it out to the square. Either way will show plainly whether the blade is even to center or not.

Always try both ends and have them as near alike as possible and nearly up to the center before starting.

We then replace the revolver in the bearings, screw down the caps, and see if the blades will cut dry paper. If at any point they refuse to cut, tighten up a trifle on the upper row of screws in the bed.

After it is all set evenly, we shall have to run the revolver backwards a little to fit them together nicely, adding some flour of emery and oil. Be sure and put this on evenly. A piece of old belting for a strop works well. Be sure that the blades are loose enough not to cause any ringing or scratching while grinding, as they will burn or draw the temper very quickly while this operation is being performed; but they should be gradually set up together, so that when they are all ground they will not spring apart when the nap of the goods is pressed into them. They should run at least one hour in oil, to polish and smooth them, as they run much nicer and longer by so doing.

After grinding.—After the grinding has been in progress a short time, remove the revolver, and see if there is an even bevel on the back of the blade. Also see that the fine bevel made by honing on the face of the blade is not ground out. Care should always be taken not to grind this entirely out, as the blade wastes away very fast when this is gone. To make sure of this, always give it a few turns across with the hone before grinding, as it will brighten it up, and will be more readily observed while grinding.

If all is right, replace the revolver and proceed until finished. Then clean all of the emery and oil out of the blades. Again rub the ledger

blade carefully with the hone (or oil stone), keeping the lower part of the hone about an inch from the lower part of the flat side of the blade. Always when honing the last time, run the hone straight across, from one end to the other, never up and down, or in a rolling manner, as this destroys an even keen edge.

After cleaning the machine, put in the revolver, tighten the cap screws with the fingers, and turn the revolver with the hand to cut off the wire edges made by honing. Then tighten up the caps, put on the swab and oil it evenly and well.

Frequent oiling of the swab.—I would say here, that I always oil the swab every time I put on a new piece. I once took a room in a large mill; the finisher had been there for years, but was always troubled more or less with oil streaks on his cloth, and he did not oil his swab more than twice or three times a day. There were three shears, and it took almost half the time to sharpen and keep them in order. The trouble was that they ran too dry. The blades when warm would expand, running very tightly together. They soon got burnt and roughed up, and would not do good work. When I found time I went over them all in the manner I shall speak of soon. The result was that they ran four months continuously on hard cutting goods. I honed the

ledger blade once in two or three weeks. I met this finisher some time afterwards in my room. Very likely some one told him of the change I had made. Stepping up he addressed me as follows:

"Mr. ———, I have taken care of shears a good many years, but I must admit that you can discount me. I always had to grind once a week, two weeks at the longest, and they tell me you do not grind more than once in three or four months. Will you please tell me how you do it?"

I replied: "Certainly. Your shears were well set up when I found them. There are only two things of any consequence that I have changed about them, viz.:—I cut slow, I make my shear attendants do their hurrying when they are changing their pieces, and I oil the swab, every piece, lightly, but evenly."

He thanked me and said that was where he had made a mistake. I only speak of this to illustrate the importance of slow cutting, and the oiling of the swab properly. I then put on a piece of goods, cutting the nap very slowly at first; and, if the blades, after running a short time, are inclined to pull, I draw the revolver up $\frac{1}{8}$ of a turn of the screw. This draws it a trifle more upon the edge of the ledger.

Refusing to cut.—If after running a week or more the blade refuses to cut, press up all along

the upper row of screws in the bed a trifle. This will usually remedy the trouble. But if, after long usage, the blades become dull, remove the revolver from the boxes and insert a piece of cardboard, to throw the revolver off from the ledger blade. Replace it and run backwards, holding the hone directly on top and perfectly parallel. Slowly and lightly run from one end to the other, being careful not to give one part any more time than the other, at the same time adding flour of emery and oil to the stone. When a keen edge is obtained clear across, remove the cardboard, replace the revolver, setting off the ledger blade, by operating on the upper tier of screws, until it nearly cuts dry paper, and proceed as I have before stated.

Grinding the revolver with a hone.—I would say in regard to grinding the revolver with a hone, that many might suppose after they had ground awhile and observed that the ends of the revolver were sharp, and the middle was yet quite dull, that they ought to cease on the ends and only grind in the middle. But bear in mind that the middle of the revolver is always the dullest inasmuch as the cloth never goes to the extreme ends of the blades. Therefore after the ends are sharp and keen, proceed just the same, running the stone to the extreme end. If not, you will soon have the revolver out of true, or

hollow in the middle. After this clean and replace the revolver, etc., and with proper care, occasionally honing, they should keep sharp for three or four months, even with constant use and a little cotton worked in the stock.

Heating and scratching.—There are times when it seems almost impossible to keep the blades from heating, scratching, or roughing up. But if a close observation be made, it will usually be found that the iron on the back part of the fly blades is as high as the steel. As it is much softer it rolls or draws over the steel, and running between the blades causes them to rough up (as we term it). When this is the case, the revolver should either be sent to the manafacturers or placed upon a planer and backed off, afterwards being smoothed with a fine file, should there be any places that are not quite taken out.

Shearing the goods.—In shearing a piece of goods do not have the blades too high or above the rest, as this injures the cloth. If the listings are anyways poor it will cut them; also every little knot or pimple will be cut off. Draw the carriage down so that when the last notches have been dropped, there will be a slight tremble, or jar, on the cloth, caused by the revolver touching it lightly, but this will not be perceptible when the piece is finished. This is for woolens or cassimeres only; for worsteds the revolver should

not be allowed to touch the cloth, as it is liable to injure the threads.

Scotch finish on the shear.—The peculiarity of the Scotch finish I have spoken of, was obtained on the shear. The carriage was drawn down $\frac{8}{8}$ or one turn of the screws, from where fancy cassimeres had been shearing. It being so low that the strike or tremble on the goods was obtained, when the nap was $\frac{1}{16}$ of an inch long, the revolver kept picking the nap up, and when finished, a thick upright nap was obtained, perfectly square, and not at all dragged out, as the brushes were set off the last three runs. On the velour finish the raising brush should be set off. If the nap is required to lie straight, nothing should be done to disturb that which has been obtained on the gigs; but in this case I did not let the revolver strike the cloth, as it was inclined to disturb the lay of the nap, and make it curly.

Uneven shearing.—Sometimes pieces that are flocked and shrunk considerably, will be inclined to shear out uneven, when it is known that the shear is perfectly right, and has been shearing certain styles (that have been treated different) all even. I have at times remedied this trouble by making the back friction-roll perfectly tight; that is, I would not depend upon the friction, but lay, or cover with cloth, the delivering roll in front, until it delivered the cloth to the rest as

fast as the back roll took it away, and by dropping the carriage, so that there was no danger of cutting or the cloth being forced into the blades, it would usually shear out more even.

Now, the philosophy of this is easily explained. If the cloth draws tight over the rest, the thin places are so drawn down that the blades do not cut the nap but simply clear off the part that comes nearest to them; whereas, if the cloth goes over loose, it is more liable to cut even, as the heavy places are usually on the back, caused by more felt and flock taking in better.

Tight listings.—Sometimes the listings are dressed and woven so tight that the sides of the cloth hug the rest, while the middle perhaps is loose or just slack, and will shear out the quickest. This may be remedied by first shearing the middle about as low as required; then drop $\frac{1}{8}$ on the rest and $\frac{1}{8}$ on the carriage, letting down one or two notches. This will shear out the opposite side. Then raise the notches say 5 or 6, and raise the carriage and rest $\frac{1}{4}$ of a turn of the screw. This will shear out the remaining side; then drop $\frac{1}{8}$ on each. You will have the carriage all even again for the next piece. At the same time, goods should not come so uneven as to oblige you to resort to this plan. I merely mention these points so that in case it did happen, they could, with a little care, be sheared out even.

Keep the shear clean.—I will add a fourth word of advice Keep all of the parts well oiled and clean, even if driven with work. It is never economy to run day after day with an unclean shear.

CHAPTER VII.

CHINCHILLA FINISHING.

PECULIARITIES OF THE CHINCHILLA FINISH—METHODS OF OPERATION—THE CHINCHILLA MACHINE—SETTING THE MACHINE—RUBBERS AND FOLLOWERS—SPEEDS, ETC.

Peculiarities of this finish.—The manipulation of goods in the producing of the chinchilla finish necessitates a departure from the old rules of ordinary cassimere finishing; brings into operation some special machinery ; and opens up new ways to exercise the judgment, and to try the temper and patience of the finisher. Two methods are employed in the portion of the process before the nubbing, which methods are governed by the supply of machinery, the grade of goods and time.

In the first place, the fabric should be specially designed to produce the best effects in the finishing. The face yarn should be of a nature to produce a full nap; the weave should be smooth and free from any pattern-effects produced by the weave; and the fabric, as a whole, should have no stiffness, but rather a tendency towards sponginess.

If the previous processes have been intelli-

gently manipulated, the fulling (which should not be a very lengthy process), will leave the goods well felted, yet with an absence of hardness or stiffness. Where the goods are wool-dyed, the usual care has to be taken to keep the colors good, as every finisher understands. We will take the goods of the class named, and "put a piece through."

Methods of operation.—After fulling and washing, it should be freed from wrinkles so as to avoid any appearance of streaks due to gigging. Gig thoroughly: the writer approves of double cylinder gigs as producing the best results, and all the time should be occupied that the quality of goods and amount of machinery will admit of.

Should the conditions admit of it, the piece should be cropped, the nap straightened, and then dried in whatever manner the equipment of the room provides for. After drying, the nap should be softened up, and then it is sheared.

Right here appears a variation from the usual method as regards this process, in which, instead of the ordinary raising brush, a wire brush is substituted which more thoroughly and evenly raises the nap. When the required closeness of shearing has been attained, one or two runs are given with laying brush off, after which it is ready for the nubbing or frizzing machine.

At this point, we will retrace our steps and

show wherein a variation from the above method takes place, and also introduce a machine which plays an important part, or can be made to do so. After the gigging process, the piece may be cropped—supposing that we are going to handle it this way—then the nap straightened, after which it is run through a "whipper," face down and "whipped" on the back, which process produces an erect position of the nap; after which, the piece must be dried as quickly as possible, and the finisher must avoid as much as possible matting the nap down. After drying, the piece may be sheared as before mentioned, and taken to chinchilla machine.

There are different makes of machines which are capable of producing good work. Each kind has its admirers; but where a man takes charge of a room to finish this class of goods, he takes what machinery he finds in the room and gets all the good he can out of it. The writer, of course, has a preference.

The chinchilla machine.—The chinchilla machine is one having an oblong surface about two feet wide by five feet long, placed in a frame about three feet from the floor, over which the cloth passes very slowly face upward. Over this is a strong cast-iron "follower" of about the same size and shape of the "bed," through each end of which an upright shaft passes and is movable

up and down by means of a handle. On the under side of this "follower" is a plate of solid rubber securely fastened to it, which, on being lowered, rests on the face of the cloth. On the upright shafts is a mechanism for producing a rotary motion to the "follower" which rubs on the cloth, twisting the nap into spiral points. Other mechanism is also provided to transform the rotary to a reciprocal motion, either forward and backward, from side to side, or diagonally. The upright shafts are geared to the main shaft which passes through lower part of machine, and which receives motion from main or counter-shaft by means of a belt. The rotary mechanism is capable of being increased or diminished, thereby varying the "sweep."

Setting of the machine.—The setting of the machine is, like the rest of the different processes of finishing, dependent more on judgment than upon any arbitrary rule that can be advanced as sure; but the amount of "sweep" should not, in the opinion of the writer, be excessive. The pressure of the "follower" on the cloth is also a matter on which the judgment must be exercised.

It is important that the rubbing material be kept free from any tendency to gum up and glaze. The writer has taken the "follower" from its position at intervals of a week, and with a mod-

erately rough substance removed any accumulated grease or glaze.

Rubbers and followers.—It is of great importance that the surface of the rubber be absolutely true. If not true, it may be due to the wood which forms the back being warped, which if the case, the rubber must be removed and the surface planed. The same also applies to the bottom surface, which is covered with a good grade of Brussels or velvet carpet. All tendency on the part of the "follower" to depart from the motion required to produce the finish and effect desired, should be reduced to a minimum; such as when a "Whitney" finish is being produced, the tendency to describe a round motion should be checked, and the motion be directed in a straight line. The same with the "Petersham" or round motion; the motion should be round and not elliptic.

Speed of the main shaft.—The speed of the main shaft of machine should be not over 145 turns a minute, which will produce a speed of the rubber of about 500 turns. Fine goods have been run through the machine once, leaving (on Petershams) a spiral nub, taken to shear, cropped, and put through a second time.

Cheaper grades have been treated as before, only omitting second nubbing. There are other effects which can be produced, such as a rolling

up of the nap caused by a cross motion of the machine operating on long napped goods, diagonal effects, etc. The chinchilla machine is used to good advantage on goods with a woven pattern, on what are termed "cut beavers," where there are certain threads which are cut off in the gigging process, thereby developing the pattern, the machine bringing up more distinctly the cord, rib, diagonal, or any of the numerous patterns which have been produced. From the machine, the transit to the roll should be as brief as is possible; and while awaiting shipment the rolls should be stood on end, and avoid crowding in case.

The writer in the above brief sketch has endeavored to give an idea of a process which has stood the test of experience; but to lay out any line of details, or to give any rules to govern one is impossible, for the intelligent finisher well knows that his experience and success are due to careful study of conditions, and his observation of effects and their causes. Good success can be obtained without the use of the "whipper," but probably the use of one will produce the best effect.

CHAPTER VIII.

INSPECTING AND PRESSING.

INSPECTING THE FABRIC—SPECKING OR FINE BURLING —SEWING OR FINE DRAWING—PRESSING THE GOODS —DIFFERENCES IN PRESSING—INSPECTION—THE PERCH—SHADING WITH SAMPLE—FINISHING-ROOM BOOK AND HOW TO KEEP IT.

Inspecting.—After the goods have been sheared, we have the first opportunity to inspect them thoroughly, and to see if all has been done right since they left the looms; for there are many things in the weaving that do not show until the fabric is finished, and should be reported at once. There are also many things in the finishing, which, for the first time, we have a chance to detect, such as improper attention in the mills, in the gigs, the cloths not stretched and dried properly, and still further back, not burled and sewed as they might have been. We certainly should avail ourselves of this opportunity, and carefully inspect the goods over a perch, comparing with the original samples for colors, finish, etc. Should we find any troubles arising from any negligence of the operatives or machinery, see to it at once. If we have been keeping a correct account of the

gigging, fulling, etc., and have been obliged to make changes; if we have noted these changes on the books, which should be kept at each point of the work, we shall know at once what it is that has caused a change in the finish.

For instance, we may have a certain style coming along, that we think may be improved by shrinking a little more, or perhaps they have been unable to put in the number of picks that there should be, on account of poor work, or they are coming too light, or a trifle too heavy. If this is noted on the fulling book, we shall be able to refer back, and see what has caused a change in the appearance of the goods. It saves time if notes have been made of the changes as we go along from one machine to the other. It is always bad enough to have accidents and mistakes happen, but it is much worse to have goods damaged, and not to know how, when or where this was done.

After pulling over the perch carefully, the goods are ready for the speckers.

Specking or fine burling.—Much depends on what is to be taken out or covered up, and how we shall proceed in this. If the goods are full of wool-specks, they should be removed with the burling irons; also the large burs, etc., should be removed in this way; but cotton-speck, small burs or shives can successfully be covered

with a dotting-ink or bur-dye, which is better than picking them out, as the speckers are liable to injure the threads; and on light weights especially, there will be small holes left by specking with the irons. Even when the ink or dye is used, care must be taken not to get on too much or the cloth will be spotted. In inking, use a well-sharpened, hard-wood stick. Let each specker have a needle, with some light-colored yarn or thread, and mark each imperfection that is found by sewing the thread near it, leaving the end out long. By so doing the fine drawers can spend their time fixing the imperfections, instead of searching for them. Keep each specker's work in a book, so that any bad work can be located. Also add it up at the end of the week, to see if this part is being kept up, and that each specker is doing a fair proportion of the work.

Sewing.—The sewer's or fine drawer's business is carefully to inspect the cloth, replacing or sewing all that is possible. A skillful hand at this work can often more than save her wages in about 30 minutes. Small threads left out by the other sewers, little imperfections made in the weaving or the finishing, coarse threads, imperfect twist, should all be mended nicely at this point, as it can be done much better before pressing than after. I have always had the best results by using yarns taken from the goods we were at work upon.

If the yarns are not washed, they surely will not shade alike; and many times the other colors have some influence in changing the shade, so that it is almost impossible to wash by hand the yarns and have them the same as in the piece. I therefore cut off an eighth or a quarter of a yard, or take a small strip off the side, saving it to mend others that may be coming along, of like colors.

After carefully looking the face over, pull them back over the perch and through light, closing all small holes or light places, either on the face or on the back. It is impossible to give any more information in regard to sewing. Always have, if possible, a first-class workman. After leaving the perch, the goods should be brushed clean on the back and face, and then they are ready for pressing.

Pressing.—This part of the work is very essential, but not so difficult to manage as the shearing, since we now have the improved rotary presses. With the old-style press it is more tedious than complicated to have to paper up all of the cloth, and to lay up with warm plates. Then three or four men had to take hold of the bar and work for ten or twenty minutes turning it down. Even with the hydraulic presses the cloth has to be papered sometimes twice, as in the old screw press, to avoid the folds made by

the papers on the edge of them. This is now done away with. There may be a few that have not made improvements, but a man would see that if he only intended to run his mill two years, he would save money and do the work better.

It is unnecessary for me to dwell upon the use of the old style press. Neither can much be said of the new; it is so simple and practicable that a boy is able to do the work, where before it has taken two or three men. If anything breaks about the machine, which seldom happens, it can easily be fixed or sent to the manufacturers for repairs. The "Gessner Press," I think, is the best for all purposes, and considered as the most efficient by all practical men.

Differences in pressing.—If I had a cheviot finish or anything similar, I always pressed them face to the cylinder; but fancy cassimeres, worsteds, etc., with the face to the bed, and for these reasons: With the face next to the roll, the curl to the nap was not disturbed or dragged out, but with the nap cut close and nothing to disturb it, I could get more luster the other way. Either way, I always try to put the most pressing on the back, by having the pressure on the back the warmest. It does not leave the fabric so harsh, dry and crispy, but helps give it the cool, damp feeling which is always desirable. The goods should be well dry-steamed, and put upon a roll and let lie there until they are perfectly cool

before being removed. Put them into a rack. Never pile them up, or let them lie on the floor.

Inspecting.—At this point of the work a good, capable man should be employed, one that can be depended upon. A few strokes of the pen or pencil, crayons, etc., will save many dollars. In a small room the finisher might find time to do this, but in a 10 to 15 set mill he will have business enough without being tied to the perch. An inspector, with an assistant, should be able carefully to look over all the goods, measure them, keep the books, shade, roll and case up for a 10 or 12 set mill on fancy cassimeres.

The best light that can be obtained should be used; also all of the conveniences procurable, as this is the last time we shall be able to inspect the goods before they go to market.

A few years ago it was not necessary to take so much care. The goods were usually pulled over a table, measured and inspected, and a sample laid on to see if they were of the right style before putting on a ticket. But those times have gone by, and everything is being done to make the goods as nearly perfect as possible.

The perch.—The best way to inspect goods is to pull them over a perch. Have it as high as possible, for a much better view can be obtained. Have a board covered with zinc, to make a good, smooth surface, directly back of the cloth, about

as high up as convenient to work upon. Below have a box to pull the cloth into, to keep it off the floor, or it may be run upon a roll again, it being very easy to apply power from below and have a lever to operate on with the foot; but it is just as well to pull them into a box and pull them over the table, measuring and rolling at the same time.

In order to have some system about the work, those goods that are measured to-day, leave on the rolls in the rack until to-morrow morning. Unroll and at the same time fold them (if they are $\frac{6}{4}$ goods), then roll them upon a board and place on the table, putting all of the same style together. Unroll the ends about a yard, and lay them over the end of the pieces in layers or folds. Then place the original sample on them and see how near they match, or shade.

Shading with sample.—If buyers purchase a case of goods, they expect that every piece shall shade with the sample. They have no idea how difficult this is, neither do they care. If they have got a bargain, they will not often think or be so critical about the shade; but this makes no difference. The manufacturer that can best please his customers is the one that will get along best. Now it is almost impossible to make every piece look alike, and the man that invented

the cutting machine, where from one to a dozen thicknesses of cloth are cut at once, has done as much to cause unhappiness for the finishers as the dull trade has.

But we must do something to remedy this trouble. A, B and C each want 10 pieces of a certain style. We shade the pieces with the original, and find that they are not all alike; that perhaps six pieces shade all right, but two are off shade, but not very bad. We will cut off a sample from one of the two and mark it $\frac{1}{10}$ (one-tenth) or thus, "Style 748^1." Next morning when we shade up this style we may find some of each, that is, of 748 and 748^1. Perhaps another piece may come along that does not shade with either sample. We then should have to call it 748^2, cutting a sample off as before. Now, if A gets 10 pieces of 748^1, he will not usually find much fault; but if he gets some of each, he has reason to complain. In a lot of 30 pieces, there would not likely be more than two or three shades at the most; and when a customer wants 5 or 6 pieces, there should not be much trouble in giving them to him all alike by this system.

I have been successful with it, and never have had any serious claims for not shading together. I also know of many others who follow it.

After shading, box and invoice if packed endwise. If laid down flat in the box, it will be necessary to invoice first.

Finishing-room book.—It is very essential to keep an account book, or what we term the

WEAVING.						FINISHING.						
Date.	No.	Yds.	Wt.	Pks.	Lot.	Remarks.	Style.	Yds.	Wt.	Alw.	Rem.	Case.	Remarks.
May 20th	2904	39	25	60	498	2 mispks.	2404	38¼	26	¼	1½	17011	A little streak'd.
	5												
	6												
2908	7	38	24⁶	60	498	Wrong draw.	2404	37	26²	1/8	—	—	Sec. No. of draw.
34													
25²													
54													
499						Floats 20c off.	2560	33²	27	⅜	1¼	17012	Floats alw. for.

"finishing-room book," one which covers the weaving account as well as the finishing. I will give a form of a very simple and convenient book. The numbers of the pieces are put on in the weave-room, and the same are used for the finishing-room on the tickets.

They may not come along in rotation, but can be filled in as fast as they are measured up. We shall be able to tell at a glance whether we have a piece of a new lot of yarn; whether the imperfections have been discovered in the weave-room; how they hold out for length, etc.

CHAPTER IX.

WHY GOODS DO NOT FINISH ALIKE.

VARIATIONS IN THE FILLING—OILS USED UPON THE STOCK—TWIST IN THE YARNS—WRONG SHADES IN THE DYE-HOUSE—DIFFERENCES IN FULLING—VARIATIONS IN THE GIGGING AND SHEARING.

Differences in finish.—There are so many reasons why woolen goods do not finish alike, and look alike when finished, even when they are of precisely the same style, that it is almost impossible, at times, to tell just what the trouble is. There is likely to be less difficulty on black, or even fancy, worsted than on fancy cassimeres, as the former do not have to go through so long a process in finishing. At least, they escape the fulling mills, which do more to change a piece of cassimere than any other machinery in the room.

In the finishing-room.—Usually, the first place in which to look after any trouble of this kind is the finishing-room. Those that have an oversight of the work before it gets to this department, are generally positive that they have made forty or fifty pieces so *exactly* alike that there can be no difference in the stock, or in the way in which they are woven. Stop for a moment,

and see how easy it is to have two lots of filling —especially black, and of the same stock—vary, for some reason, a quarter or half a run in size. We are in a hurry for this particular style. It is ordered into the goods. (I have known this to happen.) When finished they do not look alike. At the same time, the finisher cannot tell why this is so. How often does the superintendent tell him what it is that makes the trouble! He may not be to blame; but, at the same time, these little vexations are a source of much inconvenience.

A supposed case.—Without any doubt, seven times out of ten the trouble of "off shades" is caused in the finishing-room. But we will first go outside of this department and see if we can find any difficulties that may have a bearing on the case. We will take good, clean, all-wool stock and make a hundred pieces, or thirty-two hundred yards, of a certain style. Fifty of these must be put through the works immediately, to fill early orders. The others we can put in a month or two later, inasmuch as we have other styles to fill in with, to keep the works moving. We are "driven up," and it is impossible to color and card the whole lot at once; or, even if colored, the stock for the fifty pieces may lie around quite a length of time.

Now, there is one trouble that may arise

from this. If the filling is colored black, and not done properly, the longer it lies, the more tender it will get. I have seen nice, strong, clean wool, good staple, etc., after being colored and put in the stock-house two months, taken out as tender and soft as pulp. If this went immediately through the works, it would probably not be noticed. At the same time, it would be impossible to finish these two lots alike. They would not take the same gigging. If so, one must come out tender; and this would never do.

Oiled stock.—Then again, when the stock is oiled, and lies around, no matter whether in the yarns or any other condition, the goods do not work as well in the mill as those that have come directly through.

I have known of tests being made of oils by putting through a small lot of stock or goods that would work first-rate. It would be adopted, and in six months the mill was completely bunged up. The cards were so badly gummed that it was impossible to get good work. The finisher had made numerous second-quality pieces, full of splits, unclean, uneven or cockly. All the finisher could do was to use an excessive alkali to cut this gummy substance, and this had a bad effect on the colors. Again, off shades were made.

Variations in yarns.—Many times, when the

superintendent gives his orders for yarns to be spun a certain size, the spinner finds, with the stock which has been given him, an utter impossibility to spin so fine. The result is heavier yarns.

More or less twist in the yarns also has a bearing on the finishing. I have seen the same stock, sorted by the same sorter, but dyed, carded, spun and woven in different mills, then finished by the same finisher, and pieces from one would full two hours longer than the other (the same style at that). I have also seen stock taken from the same bin in the wool-room and treated as above. One mill would give perfectly strong cloth; the other was as tender as paper pulp, dry, harsh and crispy. Would any one question why goods do not finish alike, with such difficulties as these? There must be a fault somewhere. In this case, it was in coloring the wool. Sulphuric acid is all right in its place, but too much of it makes bad work.

This covers the difference in workmen of different departments before the finishing. Therefore, it is not impossible that there be a difference under one man's management. Different carding and spinning machinery, tops and bottoms of the finishers in the card-room—all of these points have their bearing upon the results in the finishing.

Oils and oiling.—Oiling the stock for the cards, and the kind of oils used, are very essential matters. Care should be taken to use only the best. There is nothing saved, and many times is a great loss, by using a cheap or an inferior article. To illustrate this: I once had some fine all-wool cassimeres. I had my soaps all regulated on my selling samples, and was running safely, or just strong enough to start the grease and still preserve my colors. Everything worked nicely in the mills for a month or two, when, all at once, I began to have cockly goods. They were uneven, and in places the grease did not start. The cockles were not confined to a single bobbin, but were perhaps from half a dozen to a dozen where the grease did not start. They did not look as though they were made in the weave-room. This trouble was at once placed in the finishing-room. As there had been no change whatever in the stock, I overcame the difficulty with strong soaps in the fulling mills, so as to start the hard places at once, that they might commence fulling and felting with the rest of the piece.

After this had been accomplished, the superintendent told me that they had bought a job-lot of oil alleged to be the same as that they had been using. Inasmuch as it could be bought 20 per cent. cheaper, they considered it a bargain.

It was—to the man that sold to them. It was an inferior lot, and the result was that the yarns got mixed with new and old oil. One started well; the other did not. Why did not these goods match the selling samples? Why did they not finish like or with the goods that came around for the first month or two? The superintendent could conscientiously say that the stock was the same, and that he was doing just as he had been at first, and that the fault must be in the finishing. At the same time, that did not help the matter any.

The colors.—One more trouble which I wish to speak of before I commence to find fault with the finishing-room, is in regard to colors. How easy it is to get wrong shades from the dye-house! I had taken particular care to get out a line of selling samples, and they were pronounced A No. 1 for design, fabric, finish and colors. Many of the styles were ordered into the works, and all were coming out first-rate, matching or shading with samples. I was positive just how long each and every piece fulled; how strong both fulling and scouring soaps were; just how they were gigged and generally treated. All at once, one particular style came wrong. There was considerable green (of a dark shade) in the filling. It was all turned to a yellow. The finisher must be to blame this time. The superintendent was

positive that it was the same lot that the sample was made from.

The dyer was positive that this same color, made in exactly the same way, was being used by numerous mills successfully. The agent and owners were convinced that it must be in the finishing; and things began to look rather interesting for the finisher. There were four or five to one, and all as positive as he was that they were right.

As soon as the goods were sheared, I inspected them carefully over a perch, and after looking over several, I came across one in which the colors were all right for three or four yards on the end of the piece; then a few yards were wrong; then there would be a few bobbins right; then pick-and-pick alternately (the green was woven on two shuttles), and so on throughout the piece.

This was the evidence I was looking for, but had hardly expected to find. The green in the goods *was not* made the same as that in the samples, and was not properly colored, or it never would have turned as it did with the treatment it received in the finishing. In fact, it was proved by getting another lot around claimed to be colored the same way, which came out all right with the same treatment.

I have mentioned these facts to show that

even before the goods or stock have been started twenty-four hours, something may occur that has a bearing upon finishing them all alike; and no matter how positive we are that everything is right and made exactly the same, we are liable to be mistaken. And little things will occur that have a very important bearing upon finishing forty or fifty pieces of cassimere so that they all finish alike, and shade alike when finished.

Various causes of difference.—There are many times when a finisher thinks that he has everything all right, and sees no reason why every piece should not come out exactly alike, when in fact, by some negligence on the part of his help, they are not all being treated exactly alike, or near enough to look alike when finished.

For instance, we will put two pieces in the fulling mills, one on each side. There may be two or three yards difference in the length. If the same amount of soap be used on each piece, the short one must have the most. If one piece is exceedingly wet, and the other just moist enough to full and felt properly, this must make a difference. Or if one fulls from a half hour to an hour longer than the other; or if one is taken out 54 inches and the other 55½ inches width, even if both are stretched out the same on the drying machine, there must be a difference. If one piece has the picks put in on the loom, and the

other in the fulling mill; if there is more friction on one side of the mill than on the other, or if one side heats more than the other; or even take separate mills and let any of the above conditions occur, they are not being treated *exactly* alike, and there is a chance for variations in the shade.

Changes in the soaps will, of course, have a very decided effect. A piece of goods fulled in a perfectly neutral soap, and one in a fair alkali, will not look alike. Leaving aside colors, they hardly look as though they were made from the same stock. The piece fulled in neutral will be firmer, more even on the face, and not so dry and crispy as the other.

If one piece is light in weight, and has to be flocked, there is a difference. With the scouring, if one set runs 20 minutes, the other 30, they are not being treated alike. Or if one is washed with warm water, the other with cold, we are again running chances. Or a variation to any great extent in the rinsing with cold water will be noticed.

Variations in the gigging by having the pieces too wet or too dry; some sets done with old teasels, others with new or sharp ones in the cylinders, must have an effect later on. The same with the shearing. Any difference in the nap or length of it; whether cut evenly or

pulled out; whether the revolver strikes hard on to the cloth, or the carriage is set high enough to escape this; a difference in the pressure, or heat or dry steaming when pressed—all have an important part in regard to shades. But there should be no difference in the least, if the goods are made and finished *exactly alike.*

CHAPTER X.

SOME PRACTICAL RECIPES AND TWO FORMULAS.

TO FIND THE CONTENTS OF A TANK—TO FIGURE SPEED—TO REMOVE BUR-DYE CROCK—TO TEST WOOLEN GOODS.

To find the contents of a tank.—To find the contents of soap, bur-dye or water tanks: Multiply the diameter by the diameter in inches, then by the depth; then multiply by .0034; the answer will be the number of gallons in the tank.

EXAMPLE.—Tank 50 inches in diameter and 40 inches deep; $50 \times 50 = 2500 \times 40 = 100{,}000 \times .0034 = 340$ gallons.

Good specking ink can be made from the following:

4 oz. soluble blue,
1 oz. extract fustic,
½ oz. oxalic acid,
¼ oz. chrome,
1 gallon water.

Dissolve fustic; add the acid, blue, and chrome; boil until thoroughly dissolved; stand 24 hours before using.

To figure speed.—1. Given speed of shaft, size

of driving pulley and size of driven pulley, to find speed of machine:

EXAMPLE.—Speed of shaft, 80 revolutions per minute; size of driving pulley, 10 inches; size of driven pulley, 8 inches; $80 \times 10 = 800 \div 8 = 100$, or speed of machine.

2. Given speed of machine and size of driven pulley, and speed of shafting, to find required size of driving pulley:

EXAMPLE.—Speed of shaft, 100 revolutions; speed of machine, 175; driven pulley, 12 inches; $175 \times 12 = 2100 \div 100 = 21$ inches, or size of driving pulley.

3. Given speed of machine, size of driving pulley and driven pulley, to find speed of shafting:

EXAMPLE.—Speed of machine, 200; of driving pulley, 20 inches, and driven pulley, 8 inches; $200 \times 8 = 1600 \div 20 = 80$, or speed of shafting.

To find circumference of pulleys, etc.: Multiply the diameter by 3.141592.

EXAMPLE.—A pulley is 12 inches in diameter; what is the circumference? $12 \times 3.141592 = 37.6991+$.

To remove bur-dye crock.—Sulphuric acid reduced so it is just a trifle sour, will remove bur-dye. If it takes out too much color, rub lightly with ammonia.

To test woolen goods.—Take caustic potash, put in a small piece of goods, and let boil five or ten minutes; rinse out well with cold water. The potash will eat the wool, and leave the cotton, wool being an animal substance.

THE END.

IMPROVED WOOLEN SHEAR.

(SEE OPPOSITE PAGE.)

CURTIS & MARBLE, - - WORCESTER, MASSACHUSETTS.

CURTIS & MARBLE,

MANUFACTURERS OF

Cloth Finishing & Wool Burring Machinery

INCLUDING

SHEARING MACHINES

For Wool, Worsted and Cotton Goods, Plushes, Velvets, Carpets, Smyrna Rugs, etc.

SINGEING, GIGGING, NAPPING, BRUSHING MACHINES.

Cloth Winders and Measurers, Shear Grinders, Patent Reversible Flock Cutters, etc.

SOLE MANUFACTURERS OF

Gessner's Patent Rotary Cloth Press.

Improved "Goddard" Burring Pickers.

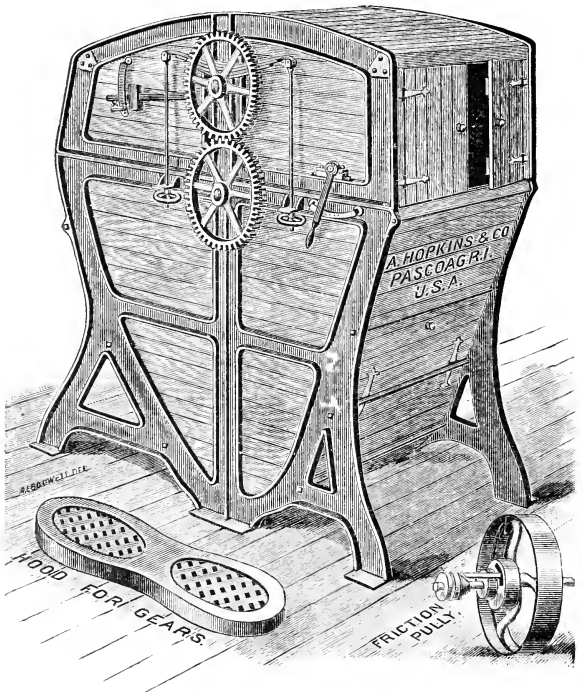
Steel Ring Burring Machines and Feed Rolls for Wool Cards.
Spur Tooth Pickers, Shake Willows, etc.
Particular attention paid to Repairing and Grinding Shear Blades and Bur Cylinders.

SEND FOR ILLUSTRATED CATALOGUE.

WEBSTER SQUARE, WORCESTER, MASS.

(SEE OPPOSITE PAGE.)

NEW UNIVERSAL FULLING MILL



Designed and constructed on the latest and most approved plans. Adapted to Felting and Flocking all kinds of Woolen Goods. Contains points of special merit found in no other. Has only to be seen to be appreciated. Before buying examine ours Send for Circulars, Prices, etc., to the Sole Manufacturers,

A. HOPKINS & CO.,

PASCOAG, R. I.

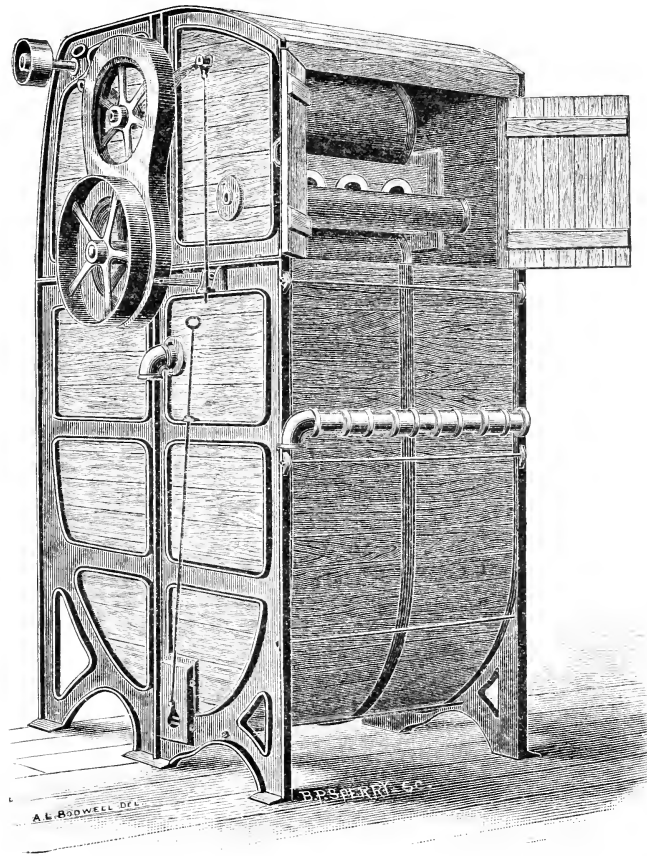
Providence Office, 48 Exchange Place.

HOPKINS' IMPROVED CLOTH WASHER.

Patented March 17, 1874. Improved 1885.

HAS NO EQUAL FOR THOROUGH AND RAPID WASHING.

Greatest economy in the use of Space, Power, Soap, Water and Time.
Machines are built in three sizes, for 4, 6 and 8 strings respectively. Are constructed with heavy iron frames, lined with Southern hard pine.



Our 4-string Machine occupies less space than the ordinary 2-string Washer.
For particulars, prices, etc., address the sole manufacturers.

A. HOPKINS & CO., - - - - PASCOAG, R. I.

PROVIDENCE OFFICE, 48 Exchange Place

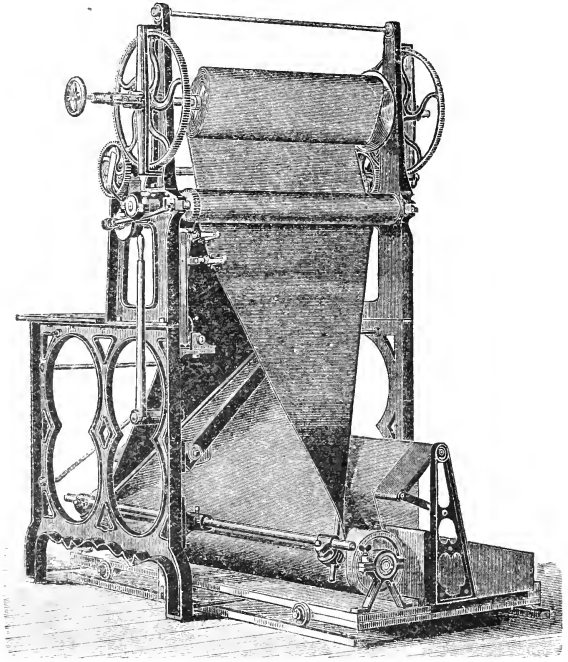
THE ILLUSTRATION REPRESENTS

J. E. WINDLE'S

New and Improved

⁘ Cloth Folding and Rolling Machine ⁘

OF 1886.



THIS machine has all the requirements necessary for doubling and rolling all kinds and classes of both Cotton and Woolen Goods in a most satisfactory and thorough manner. It will fold the goods more evenly than any other machine, and requires very little attention in operating. We guarantee perfect satisfaction in each and every case, and will place it upon its merits against any and all others.

For further information address the Manufacturer,

J. E. WINDLE, Worcester, Mass.

The Heathcote Improved Tentering and Drying Machine.

These machines have been greatly improved within the last six months, and will recommend themselves to manufacturers who intend furnishing their mills with improved machinery for Tentering and Drying Purposes. They have been arranged so as to take up much less room in height than formerly, and have an entire new heating apparatus, by which the drying is largely increased, and will guarantee perfect satisfaction in every particular. We build various sizes, and they are adapted to all kinds of woolen or worsted goods. It takes less room, less power and steam than any other machine in the market.

JOHN HEATHCOTE,

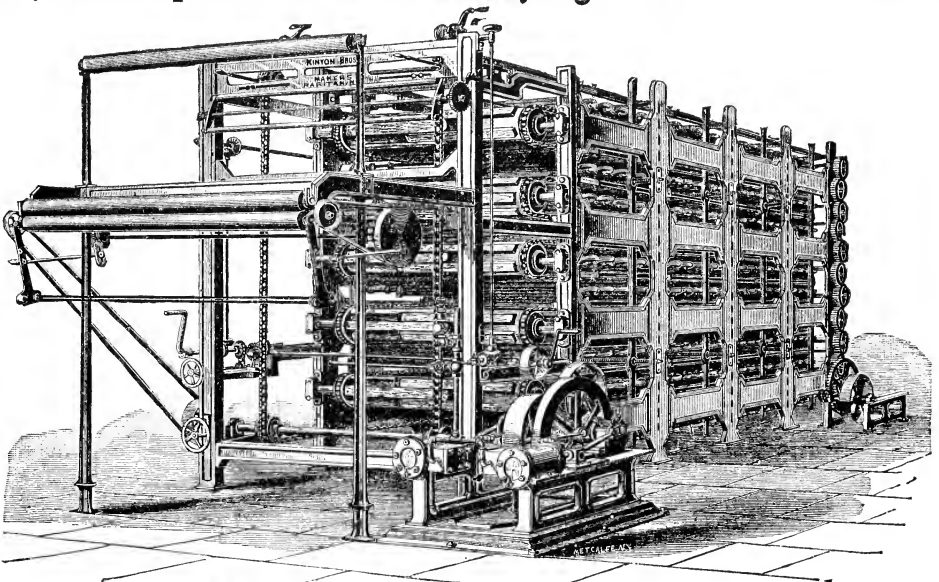
SOLE MANUFACTURER,

PROVIDENCE, R. I.

Send for Circular.

Kinyon's Improved Tenter and Drying Mills.

TEN SIZES.
SEND FOR CIRCULAR.

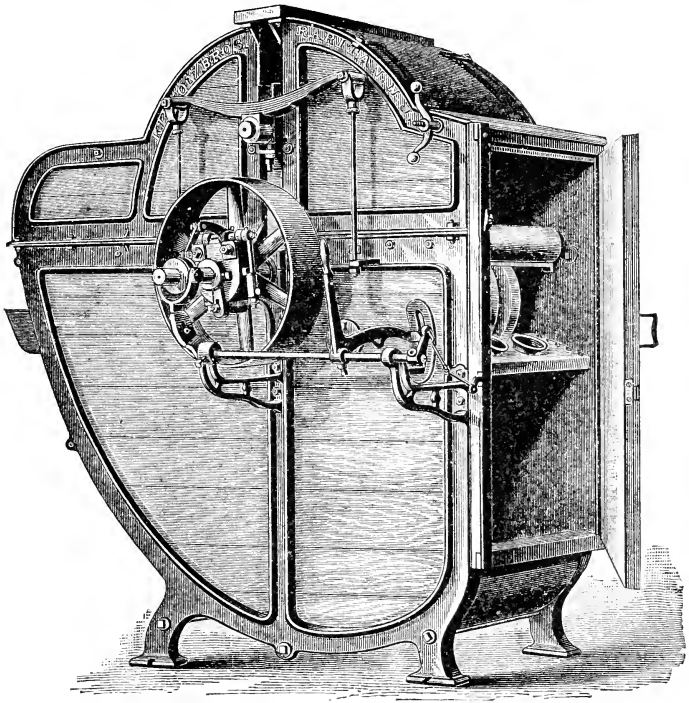


Manufactured by **KINYON BROS.,** RARITAN, N. J. Central R. R. Division of Philadelphia and Reading R. R.

KINYON'S FULLING MILL,

With Rubber-coated Rolls.

Fulls rapidly, and will not damage the goods.



Manufactured by

KINYON BROS.,

RARITAN, N. J.

Central R. R. Division of Philadelphia and Reading R. R.

JAMES FOLEY & CO.,

Manufacturers and Dealers in

TEXTILE SOAPS,

WOOL-SCOURS,

CHEMICALS, ETC.

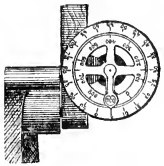
For the Uses of Manufacturers of

Woolen, Worsted, Silk and Cotton Goods,

127 MILK STREET, BOSTON, MASS.

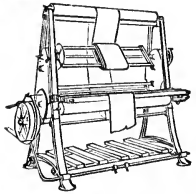
An experience of over twenty years with mill soaps in the mills of New England, is a sufficient guarantee of our ability to answer any questions that may arise on the use of soaps under varying conditions. Address as above.

FINISHING MACHINERY.



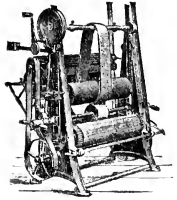
Measuring Attachments

For all kinds of Goods, Warps and Yarns; from 50 to 1,000 yards.



Lapping Machines,

Plain and with compensating gearing, causing the goods to pass with regularity through the measure rolls.

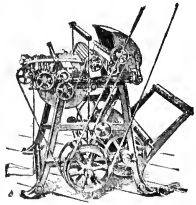


Rolling Machines,

Used principally for carpets The goods are rolled as tight as possible without friction bars, retaining the full width of the goods, making a roll as hard as a log. The goods retain finish, and lay flat when unrolled.

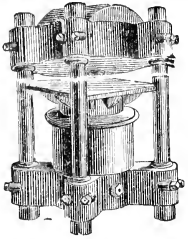
Shearing Machines

For all kinds of goods—for Print Cloths, Jeans, Flannels, Cassimeres, Carpets, Rugs, etc. The Ingrain Carpet and Print Cloth Machines are arranged to finish the goods, once passing through. Rolling and Shearing Machines combined. Napping and Brushing Machines to suit all kinds of goods.



Presses for Baling and Finishing

Hydraulic-Screw or Toggle.
Continuous-roll Press.



SHEARING MACHINES FOR DIAGONAL STRIPES, SQUARES, DIAMONDS AND OTHER FORMS OF RAISED GOODS.

SPIRAL AND BLADES FOR ALL MAKES OF MACHINES.

GRINDING AND REPAIRING HAS PROMPT ATTENTION.

DRYING AND STEAMING MACHINES.

A PERSONAL EXPERIENCE OF OVER FORTY YEARS ON THIS CLASS OF MACHINERY GIVES US CONFIDENCE THAT WE CAN SERVE OUR CUSTOMERS SKILLFULLY.

GEO. C. HOWARD,

1785 BARKER ST., PHILADELPHIA.
12 T CORTLANDT ST., NEW YORK.

J. McLAUGHLIN'S SONS,

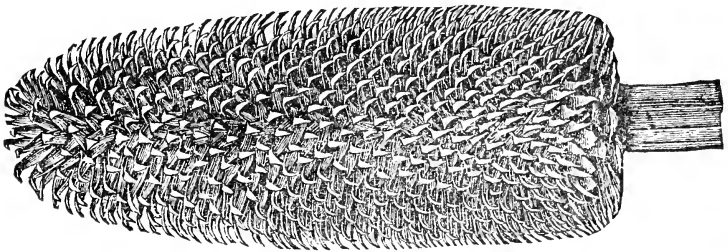
GROWERS, MERCHANTS, AND EXPORTERS OF

AMERICAN TEASELS.

SKANEATELES FALLS N.Y.

THOMAS C. KELLOGG,

SKANEATELES, N. Y.



Teasels are
Grown, Cured and
Packed on
own Premises.

DEALER IN
AND GROWER OF **AMERICAN TEASELS.**

CLIPPED AND PACKED TO ANY DESIRED SIZE.

NEW YORK OFFICE, 100 AND 102 READE STREET.

A. H. KELLOGG, Manager.

Correspondence Solicited.

Samples sent by Mail upon application.

GET THE BEST

Fulling Mills Cloth Washers,

Soaping and Wetting Machine.

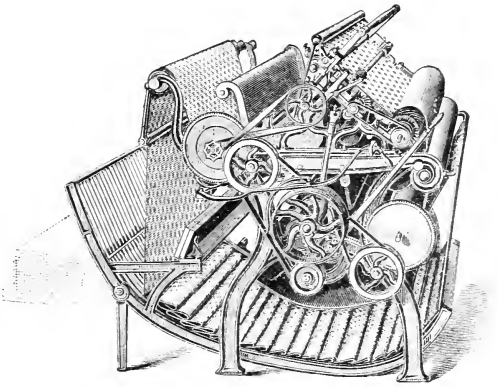
MANUFACTURED BY

JAS. HUNTER & SON,

NORTH ADAMS, MASS.

Send for Illustrated Agents' Circulars.

This is the only Shearing Machine with Self-Operating List Savers made.



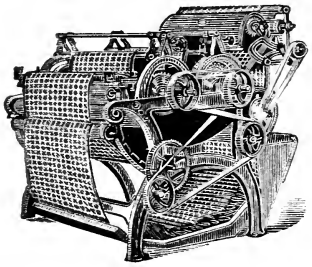
PARKS & WOOLSON MACHINE CO.,

SPRINGFIELD, VERMONT,

MANUFACTURERS OF

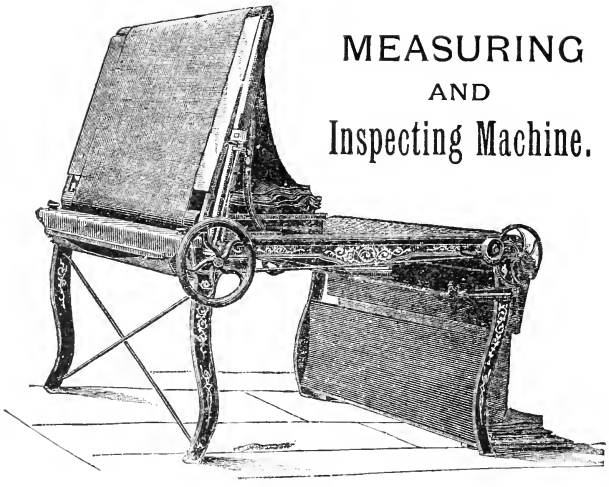
Cloth Finishing Machinery

OF EVERY DESCRIPTION.



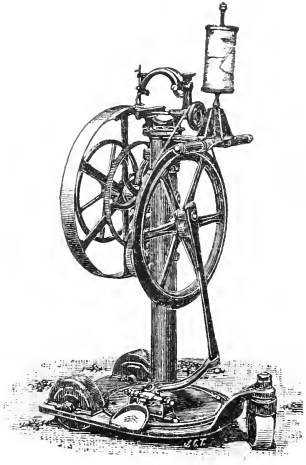
Send for Circular.

C. E. RICHARDSON, Treasurer,
A. WOOLSON, President.
ADNA BROWN, Gen'l Superintendent.



MEASURING
AND
Inspecting Machine.

Measuring Machine that cannot measure wrong and needs no care or adjustment.



Doubling and Rolling-up Machine

For Both Cotton and Woolen Finishing.

Tillinghast Sewing Machine & Supply Co.

PROVIDENCE, R.I.,

Dealers in

Factory Sewing Machines, Factory Twines And Sewing Threads,

AND

Special Machinery for Cotton & Woolen Mills.

Doubling and Rolling-up Machine by which a boy can do the work of four men, and 100 per cent. better than it is possible to do it by hand.

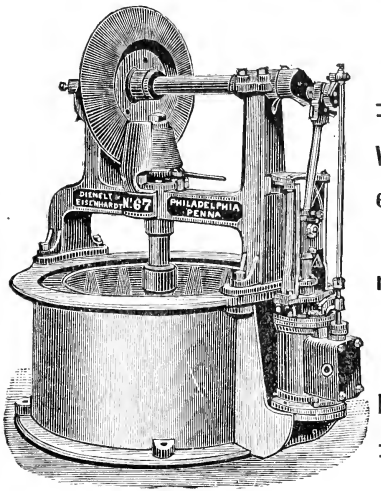
DIENELT & EISENHARDT,

MACHINISTS AND MANUFACTURERS OF

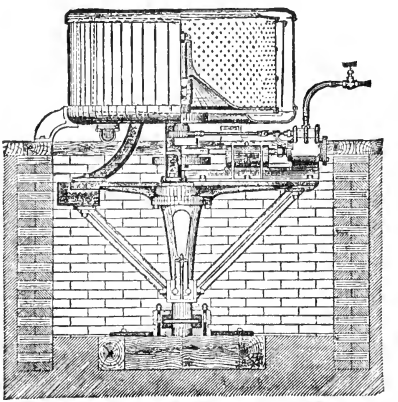
Centrifugal Hydro-Extractors,

1306, 1308 and 1310 HOWARD STREET,

PHILADELPHIA.



With friction, direct engine, belt power, and also new self-balancing under-driven steam machine, Pat. July 20, 1886.



CONNOR BROTHERS,

HOLYOKE, MASS.

Manufacturers of all Grades and Colors of

WOOLEN SHODDIES

AND

EXTRACTS.

Stock Picked and Carded to Order.

Also Manufacturers of all Grades of

WOOLEN FLOCKS.

THE BRIDESBURG MANUFACTURING CO.

OFFICE, 201 CHESTNUT STREET, PHILADELPHIA.

BUILDERS OF

Cotton, Woolen and Worsted Machinery,

CARDING, SPINNING, WEAVING,

AND ALL OTHER MACHINERY USED IN COTTON, WOOLEN AND WORSTED MILLS.

We respectfully invite attention to the recent improvements made by us upon all our Machinery, and especially to our

POWER SAVING RING SPINNING,
For Cotton and Worsted, the bobbins driven positively, spindles will run at any required velocity.

SELF-ACTING MULES FOR WOOL,
Bobbin Winders or Quillers, with spindles driven at variable speed, giving greater production and saving waste.

LOOMS
For Cotton, Jean and Worsted Goods, running two hundred picks per minute, and our recently improved and superior

FULL LIFT AND FULL DROP BOX LOOMS,
For Ginghams, Checks, as well as Broad Looms for Shawls, etc.

STOCKTON BATES, President. CHAS. W. POTTS, Treasurer.
JOHN ROMMEL, Jr., Vice-Pres. WILLIAM D. SHUBERT, Secretary.

Practice in Wool Carding.

1.—Carding Fine Wools.

2.—Difficulties in the Card Room, and how to Overcome Them.

By JOSEPH BROWN, Master Carder.

A complete, concise and helpful handbook for the card room, by a carder of more than forty years' experience.

More than 2,000 copies of this little book have been sold since its recent announcement.

Price, 50 cents; five copies for $2.00. Sent post free upon remittance to

THE TEXTILE RECORD,

425 Walnut Street, Philadelphia.

$3.00 A YEAR.

THE TEXTILE RECORD

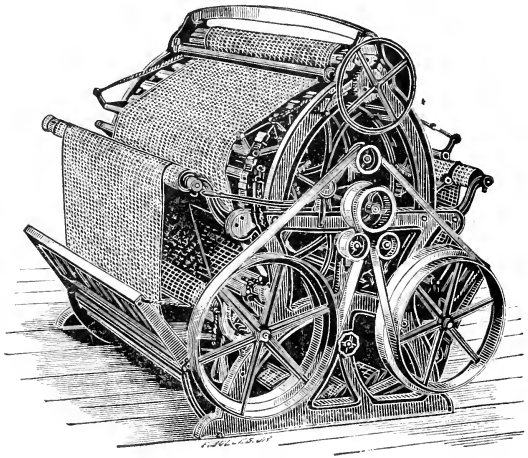
CONTAINS MORE ORIGINAL, PRACTICAL INFORMATION FOR ACTUAL WORKERS IN TEXTILES, THAN ANY OTHER JOURNAL IN THE WORLD.

THE TEXTILE RECORD IS WRITTEN FOR PRACTICAL MEN BY PRACTICAL MEN. SAMPLE COPIES UPON APPLICATION TO

THE TEXTILE RECORD,

425 Walnut Street, Philadelphia, Pa.

BROWN'S QUADRUPLE GIG.



Having four applications of the cloth to the cylinder, with an attachment for cleaning the teasels without taking them off the cylinder. The slats are held on the cylinder in a way that enables them to be placed close together, increasing the capacity of the gig. This gig is a favorite with the finishers, doing more work than any other gig sold for the same money, and takes up but little room, which is desirable in many mills.

PARKS & WOOLSON MACHINE CO.,

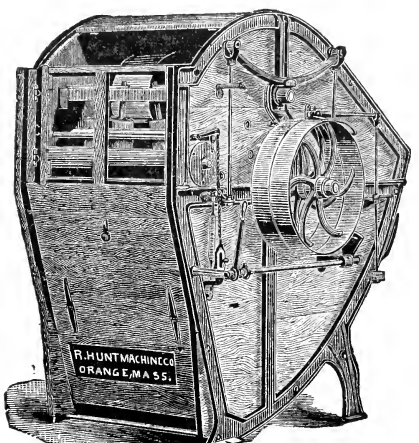
SPRINGFIELD, VERMONT.

RODNEY HUNT MACHINE CO.,

Engineers and Machinists, Iron and Brass Founders

ORANGE, MASSACHUSETTS.

TURBINE WATER WHEELS AND WOOLEN MACHINERY.



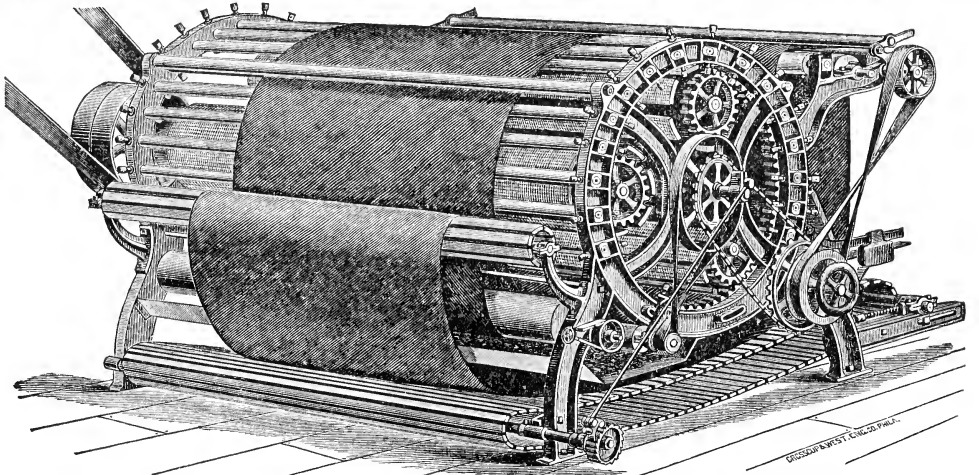
Improved Rotary Fulling Mills,
Pushers, or Crank Fulling Mills,
Hammer Falling Stocks,
Dolly Washers for Hosiery Goods,
Cloth Rinsers, or Washers,
Cloth Winders, Rag Washers,
Wool Washers, Soaping Machines,
Squeeze Rolls for Speck Dyeing,
Dusters, Gigs, Extractors, Dye Tubs,
Blue Vats, Tanks, etc.

SEND FOR CATALOGUE.

NEW IMPROVED ROTARY WIRE GIG.

AN ADVANCE UPON ALL OTHER MACHINES.

Makes Better Work, Saves Waste, Works More Rapidly than Other Gigs.



BUILT OF ANY WIDTH TO SUIT WIDE OR NARROW GOODS.

This Machine has been thoroughly Tested in practice, and pronounced by experienced Manufacturers to be Superior to all Others. No Tearing out of the Stock. The Napping leaves all the STOCK in the Fabric. Very Superior for Woolens, Worsteds, Blankets and Stockinets. The New Improved Rotary Wire Gig may be seen in operation by applying to

JOSEPH HANSON, Mascher and Somerset Streets, Philadelphia, Pa.

Bleaching, Dyeing, Drying and Finishing Machinery.

HUSK, PAPER AND COTTON ROLLS,
CALENDERS, MANGLES.

Dyeing and Drying Machines

For Cotton, Woolen and Worsted Cloth
and Chain Warps.

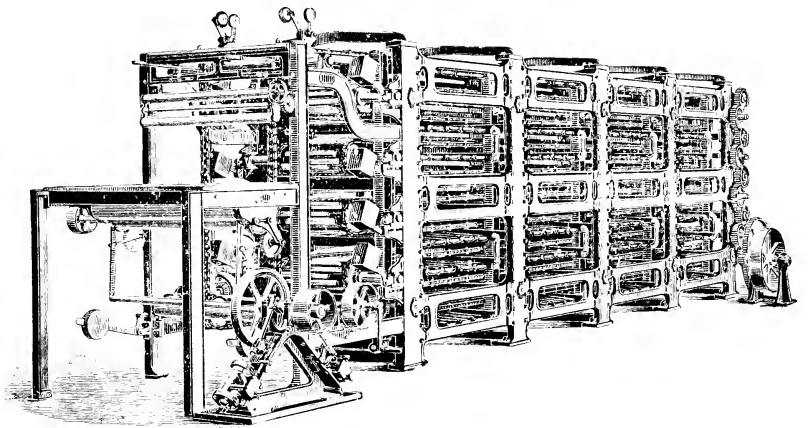
DRYING MACHINES,
TENTERING MACHINES,
HYDRAULIC PRESSES, ETC.

GRANGER FOUNDRY AND MACHINE COMPANY,

PROVIDENCE, RHODE ISLAND.

Improved Tentering and Drying Machine for Woolen, Worsted and Cotton Goods

PATENTED SEPTEMBER 23, 1884.



Dyeing Machines.

Crabbing Machines.

Steaming Machines.

These machines are of substantial construction, and will deliver goods uniform in width, and with straight, even selvedges.

Among some of our recent improvements are the following:

Slackness of chain, however caused, is taken up automatically.
Braces of cast iron, planed to uniform length, giving firmness to machine when in operation.
Different parts made interchangeable, being fitted to gauges.

Estimates and other information will be promptly given.

H. W. BUTTERWORTH & SONS, York and Cedar Sts., Philadelphia, Pa.

LIBRARY OF CONGRESS
0 015 870 886 3